

## **EOSDIS Core System Project**

# **Science and Data Processing Segment (SDPS) Requirements Specification for the ECS Project**

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Government for general use or distribution.**

Final

March 1995

Hughes Applied Information Systems  
Landover, Maryland

# **SDPS Requirements Specification for the ECS Project**

**Final**

**March 1995**

Prepared Under Contract NAS5-60000  
CDRL Item 045

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## Preface

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This document is a formal contract deliverable with an approval code 1. It requires Government review and approval prior to acceptance and use. Changes to this document shall be made by document change notice (DCN) or by complete revision.

This document is under the control of the ECS Configuration Control Board (CCB).

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# Abstract

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This document specifies the Interim Release 1 (IR-1), Release A, Release B, and Release C requirements for the Science and Data Processing System Segment of the ECS Project.

**Keywords:** Level-4, Requirement, Segment Requirement Specification, SRS, SDPS, CSCI, CI

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# Contents

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## Preface

## Abstract

## 1. Introduction

1.1	Identification.....	1-1
1.2	Purpose.....	1-1
1.3	Scope.....	1-1
1.4	Status and Schedule.....	1-1
1.5	Organization .....	1-1

## 2. Related Documentation

2.1	Parent Document.....	2-1
2.2	Applicable Documents .....	2-1
2.3	Information Documents .....	2-1

## 3. System Description

3.1	SDPS Overview .....	3-1
3.2	SDPS Software and Hardware Configuration Items.....	3-2
3.3	Requirements for Incremental Development.....	3-2

## 4. Requirements

4.1	CLS - Client Subsystem.....	4-1
4.1.1	DESKT - Desktop CSCI.....	4-1
4.1.1.1	Desktop Manager.....	4-2
4.1.1.2	Desktop Objects .....	4-3

4.1.1.3	General Desktop.....	4-5
4.1.2	WK BCH- Workbench CSCI .....	4-6
4.1.2.1	User Registration.....	4-6
4.1.2.2	User Logon .....	4-7
4.1.2.3	User Sessions.....	4-7
4.1.2.4	Service Request Processing.....	4-8
4.1.2.5	Mediation Services .....	4-9
4.1.2.6	Earth Science Search Tool.....	4-9
4.1.2.7	Document Search Tool.....	4-13
4.1.2.8	Product Request Tool .....	4-14
4.1.2.9	General Workbench .....	4-16
4.1.2.10	Advertising Client .....	4-17
4.1.2.11	EOSView.....	4-18
4.1.2.12	Subscription Services .....	4-21
4.1.2.13	Data Acquisition Requests .....	4-22
4.1.2.14	Access to Communication Services .....	4-23
4.1.2.15	User Comments .....	4-24
4.1.2.16	SMC Interface .....	4-24
4.1.2.17	Command Language Interface .....	4-24
4.1.2.18	Application Program Interface .....	4-25
4.1.2.19	Accounting .....	4-26
4.2	IOS- Interoperability Subsystem.....	4-26
4.2.1	ADSRV- Advertising Service CSCI.....	4-26
4.2.1.1	General.....	4-27
4.2.1.2	Advertising Database Management.....	4-28
4.2.1.3	Advertising Administration.....	4-29
4.2.1.4	Security Support.....	4-29
4.2.1.5	Operations Support .....	4-30
4.2.1.6	Connectivity Support.....	4-31
4.2.1.7	Performance.....	4-31
4.2.1.8	Application Program Interface .....	4-31
4.2.2	ADSHW - Advertising Server HWCI.....	4-31

4.2.2.1	Physical Requirements.....	4-31
4.2.2.2	Operating System, Utilities, and Tools.....	4-32
4.3	DMS - Data Management Subsystem.....	4-33
4.3.1	LIMGR - Local Information Manager CSCI.....	4-34
4.3.1.1	Local Search.....	4-35
4.3.1.2	LIM Schema .....	4-36
4.3.1.3	Security and Management.....	4-37
4.3.1.4	Performance.....	4-38
4.3.1.5	Operations Support .....	4-38
4.3.1.6	Mediation Services .....	4-39
4.3.1.7	Application Program Interface .....	4-39
4.3.2	DIMGR - Distributed Information Manager CSCI.....	4-39
4.3.2.1	Distributed Search.....	4-40
4.3.2.2	DIM Schema.....	4-42
4.3.2.3	Operations Support .....	4-43
4.3.2.4	Performance.....	4-44
4.3.2.5	DIM Management.....	4-44
4.3.2.6	Mediation Services.....	4-45
4.3.2.7	Application Program Interface .....	4-45
4.3.3	DDICT- Data Dictionary CSCI.....	4-45
4.3.3.1	Data Dictionary Items .....	4-46
4.3.3.2	Data Dictionary Views.....	4-49
4.3.3.3	Performance.....	4-50
4.3.3.4	Operations Support .....	4-51
4.3.3.5	Application Program Interface .....	4-51
4.3.4	GTWAY- Version 0 Interoperability CSCI .....	4-51
4.3.5	DMGHW- Data Management HWCI.....	4-53
4.3.5.1	Physical Requirements.....	4-53
4.3.5.2	Operating System, Utilities, and Tools.....	4-53
4.4	DSS - Data Server Subsystem .....	4-54
4.4.1	SDSRV- Science Data Server CSCI .....	4-55
4.4.1.1	Service Request Processing.....	4-56

4.4.1.2	Data Server Accounting Processing.....	4-59
4.4.1.3	Data Server Advertisement Processing.....	4-60
4.4.1.4	Data Server Log Processing.....	4-60
4.4.1.5	Data Server Notice Processing.....	4-61
4.4.1.6	Data Server Schema Processing.....	4-61
4.4.1.7	Data Server General Processing.....	4-61
4.4.1.8	Session Processing.....	4-64
4.4.1.9	Data Server Subscription Processing .....	4-67
4.4.1.10	Data Server Working Collection Processing.....	4-68
4.4.1.11	Data Server Test Requirements .....	4-69
4.4.1.12	Data Server Performance Requirements .....	4-69
4.4.1.13	Data Type Services.....	4-70
4.4.1.14	Data Type Services - Insertion .....	4-70
4.4.1.15	Data Type Services - Data Checking.....	4-72
4.4.1.16	Data Type Services - Storage .....	4-72
4.4.1.17	Data Type Services - Costing and Resource Utilization .....	4-74
4.4.1.18	Data Type Services - Distribution .....	4-75
4.4.1.19	Data Type Services - Inventory .....	4-76
4.4.1.20	Data Type Services - DARs.....	4-77
4.4.1.21	Data Type Services - Status.....	4-78
4.4.1.22	Mediation Services .....	4-78
4.4.2	DDSRV - Document Data Server CSCI .....	4-78
4.4.2.1	Processing.....	4-79
4.4.2.2	Document Data Server Interfaces.....	4-80
4.4.2.3	Document Data Server Performance Requirements.....	4-81
4.4.3	STMGT- Storage Management Software CSCI.....	4-81
4.4.3.1	Archive Request Processing.....	4-82
4.4.3.2	Archive Processing .....	4-83
4.4.3.3	Archive Configuration Processing .....	4-87
4.4.3.4	Archive Data Type Processing.....	4-88
4.4.3.5	Archive Log Processing.....	4-89
4.4.3.6	Archive Resource Management .....	4-89

4.4.3.7	Archive Resource Services.....	4-90
4.4.3.8	Billing/Accounting Processing.....	4-93
4.4.3.9	Archive Storage Processing .....	4-94
4.4.3.10	Archive Performance Requirements .....	4-95
4.4.4	DDIST- Data Distribution Services CSCI.....	4-96
4.4.4.1	Distribution Request Processing .....	4-96
4.4.4.2	Distribution Billing/Accounting Processing.....	4-98
4.4.4.3	Client Processing.....	4-98
4.4.4.4	Distribution Log Processing.....	4-99
4.4.4.5	Distribution Media Processing.....	4-100
4.4.4.6	Distribution Resource Processing .....	4-100
4.4.4.7	Distribution Interface Processing .....	4-102
4.4.4.8	Distribution Performance Requirements.....	4-103
4.4.5	ACMHW - Access and Control Management HWCI .....	4-103
4.4.5.1	Performance Requirements.....	4-103
4.4.5.2	RMA Requirements.....	4-104
4.4.5.3	Physical Requirements.....	4-104
4.4.5.4	Operating System, Utilities, and Tools.....	4-105
4.4.6	WKSHW - Working Storage HWCI.....	4-106
4.4.6.1	Performance Requirements.....	4-106
4.4.6.2	Physical Requirements.....	4-106
4.4.6.3	RMA Requirements.....	4-107
4.4.7	DRPHW - Data Repository HWCI.....	4-107
4.4.7.1	Performance Requirements.....	4-107
4.4.7.2	Capacity Requirements.....	4-107
4.4.7.3	RMA Requirements.....	4-107
4.4.7.4	Physical Requirements.....	4-108
4.4.7.5	Operating System, Utilities, and Tools.....	4-108
4.4.8	DIPHW - Distribution & Ingest Peripheral Management HWCI.....	4-109
4.4.8.1	Capacity Requirements.....	4-109
4.4.8.2	Performance Requirements.....	4-109
4.4.8.3	RMA Requirements.....	4-110

	4.4.8.4	Physical Requirements.....	4-110
	4.4.8.5	Operating System, Utilities, and Tools.....	4-111
4.5	INS - Ingest Subsystem .....		4-112
	4.5.1	INGST- Ingest Services CSCI .....	4-114
	4.5.1.1	Network Ingest Request.....	4-115
	4.5.1.2	Polling Ingest Request (Delivery Record File).....	4-115
	4.5.1.3	Polling Ingest Request (Files) .....	4-116
	4.5.1.4	Hard Media Ingest Request.....	4-116
	4.5.1.5	Interactive Network Ingest Request.....	4-117
	4.5.1.6	Ingest Status.....	4-119
	4.5.1.7	Ingest Request Processing.....	4-121
	4.5.1.8	Ingest Data Preprocessing.....	4-124
	4.5.1.9	Ingest Data Transfer.....	4-125
	4.5.1.10	Ingest History Log Processing.....	4-126
	4.5.1.11	Ingest Client Interfaces .....	4-127
	4.5.1.12	Ingest Performance Requirements .....	4-128
	4.5.1.12	Document Scanning/Digitizing .....	4-129
	4.5.2	ICLHW - Ingest Client HWCI.....	4-130
	4.5.2.1	Functional Requirements.....	4-130
	4.5.2.2	Performance Requirements.....	4-130
	4.5.2.3	Reliability/Maintainability/Availability Requirements .....	4-131
	4.5.2.4	Interface Requirements.....	4-132
	4.5.2.5	Physical Requirements.....	4-132
	4.5.2.6	Test Requirements.....	4-133
	4.5.2.7	Hardware Configuration Item Requirements .....	4-133
	4.5.2.8	Operating System, Utilities, and Tools.....	4-134
4.6	PLS - Planning Subsystem.....		4-135
	4.6.1	PLANG- Production Planning CSCI .....	4-136
	4.6.1.1	Production Request Processing.....	4-137
	4.6.1.2	Planning Data Management .....	4-139
	4.6.1.3	Production Plan Generation.....	4-140

4.6.1.4	Production Status Monitoring .....	4-142
4.6.1.5	External/Internal User Support.....	4-143
4.6.1.6	System/Service Management Support .....	4-144
4.6.1.7	Design Requirements .....	4-145
4.6.2	PLNHW - PLNHW CI.....	4-145
4.6.2.1	Functional Requirements.....	4-145
4.6.2.2	Performance Requirements .....	4-146
4.6.2.3	Reliability/Maintainability/Availability Requirements .....	4-146
4.6.2.4	Interface Requirements.....	4-147
4.6.2.5	Physical Requirements .....	4-147
4.6.2.6	Test Requirements.....	4-148
4.6.2.7	Operating System, Utilities, and Tools.....	4-148
4.6.2.8	Hardware Configuration Item Requirements .....	4-149
4.7	DPS - Data Processing Subsystem .....	4-149
4.7.1	PRONG- Processing CSCI.....	4-150
4.7.1.1	General .....	4-152
4.7.1.2	DP/CSMS I/F and Support Services.....	4-152
4.7.1.3	DP Request Management.....	4-153
4.7.1.4	Data Staging and Destaging .....	4-154
4.7.1.5	PGE Execution Management.....	4-156
4.7.1.6	Processing HMI and Operations.....	4-158
4.7.1.7	Data Processing Request Status .....	4-161
4.7.1.8	Data Processing Request Modification.....	4-161
4.7.2	SDPTK - SDP Toolkit CSCI .....	4-162
4.7.3	DPREP - Data Preprocessing CSCI.....	4-162
4.7.3.1	Accept TRMM Orbit Data for Preprocessing .....	4-164
4.7.3.2	Accept EOS-AM Orbit Data for Preprocessing.....	4-164
4.7.3.3	Accept Repaired Orbit Data.....	164
4.7.3.4	Quality Check of Orbit Data.....	4-164
4.7.3.5	Accept TRMM and EOS-AM Attitude Data for Preprocessing.....	4-165
4.7.3.6	Quality Check of Attitude Data .....	4-165



4.7.3.7	Provide SDP Toolkit Access to Ephemeris Data.....	4-165
4.7.3.8	Provide SDP Toolkit Access to SDPF L0 Data.....	4-166
4.7.3.9	Provide SDP Toolkit Access to EDOS L0 Data.....	4-166
4.7.3.10	Provide SDP Toolkit Access to L0 Data in General.....	4-167
4.7.3.11	Accept and Convert Selected Non-Standard EOS Products .....	4-168
4.7.3.12	Additional Metadata Extraction for Certain Ancillary Data Sets.....	4-168
4.7.4	AITTL- Algorithm Integration and Test CSCI.....	4-168
4.7.4.1	Delivery of Science Software.....	4-169
4.7.4.2	Viewing Science Software Documentation.....	4-170
4.7.4.3	Checking Coding Standards.....	4-170
4.7.4.4	Checking for Programming Errors.....	4-173
4.7.4.5	Data Visualization .....	4-174
4.7.4.6	File Comparison.....	4-175
4.7.4.7	Profiling .....	4-176
4.7.4.8	Adding an Algorithm or Algorithm Update to a Data Server.....	4-176
4.7.4.9	Updating the PGE Database.....	4-177
4.7.4.10	Configuration Management.....	4-178
4.7.4.11	Report Generation .....	4-178
4.7.4.12	Manual Staging of Inputs.....	4-179
4.7.4.13	Display of Product Metadata.....	4-179
4.7.4.14	Inspection of the Delivery Package .....	4-179
4.7.4.15	Integration .....	4-180
4.7.4.16	Acceptance Testing.....	4-181
4.7.4.17	Reporting.....	4-183
4.7.5	SPRHW - Science Processing HWCI.....	4-183
4.7.5.1	Functional Requirements.....	4-183
4.7.5.2	Performance Requirements.....	4-184
4.7.5.3	Reliability/ Maintainability/ Availability Requirements .....	4-185
4.7.5.4	Interface Requirements.....	4-186

4.7.5.5	Physical Requirements.....	4-186
4.7.5.6	Test Requirements.....	4-187
4.7.5.7	Hardware Configuration Item Requirements .....	4-188
4.7.5.8	Operating System, Utilities, and Tools.....	4-188
4.7.6	AITHW - Algorithm Integration and Test HWCI.....	4-189
4.7.6.1	Functional Requirements.....	4-189
4.7.6.2	Operating System, Utilities, and Tools.....	4-190
4.7.7	AQAHW - Algorithm QA HWCI.....	4-191
4.7.7.1	Functional Requirements.....	4-191
4.7.7.2	Operating System, Utilities, and Tools.....	4-191

## **Figures**

3.2-1.	SDPS Software and Hardware Configuration Items.....	3-3
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## **Appendix A. Data Glossary**

## **Appendix B. Requirements Matrix**

## **Appendix C. Requirements to Release Mapping**

## **Appendix D. Requirements Identification Table**

## **Appendix E. Performance Parameter Synopsis**

## **Appendix F. Data Type Matrix**

## **Glossary**

## **Abbreviations and Acronyms**

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# **1. Introduction**

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## **1.1 Identification**

The Science Data Processing Segment (SDPS) Requirements Specification for the ECS Project, Contract Data Requirements List (CDRL) Item 045, whose requirements are specified in Data Item Description (DID) 304/DV1, is a required deliverable under Contract NAS5-6000.

## **1.2 Purpose**

This document specifies the functional and performance requirements for the Science Data Processing Segment. It describes the SDPS Level 4 requirements, organized by subsystem and by software and hardware configuration item within each subsystem, and traces the Level 4 requirements to Releases and to the parent Level 3 requirements.

## **1.3 Scope**

The SDPS Requirements Specification defines the SDPS Level 4 requirements for Interim Release 1 (IR-1) and Release A. In addition, the preliminary requirements for Release B and Release C are provided. The Release B and C requirements will be expanded further during the respective preliminary design phases for these releases. Release IR-1 provides support to TRMM Early Interface Testing and Science Algorithm I&T. Release A provides support to TRMM Science Operations and TRMM Ground Systems Certification Testing. Release A also provides the functional capabilities needed to support early ESDIS Ground System Testing for the EOS AM-1 and Landsat 7 missions. Release B provides support to EOS AM-1 Mission Operations and Science Operations, and it provides support to ESDIS Ground System Certification Testing for the EOS AM-1 and Landsat 7 missions. Release B also provides archive and distribution services for the Landsat 7 and COLOR missions, and it provides product generation support for COLOR. Release C provides evolutionary enhancements to the ECS services provided in the earlier Releases.

## **1.4 Status and Schedule**

This submittal of DID 304/DV1 meets the milestone specified in the Contract Data Requirements List (CDRL) of NASA Contract NAS5-60000. It incorporates changes and follow-up actions identified as a result of the SDPS Preliminary Design Review (PDR).

This document reflects the Technical Baseline submitted via contract correspondence No. ECS 194-00343.

## **1.5 Organization**

The document is organized to describe the Level 4 Science and Data Processing System Segment Requirements.

Section 1.0 provides information regarding the identification, scope, purpose, status, and organization of this document.

Section 2.0 provides a listing of related documents, which were used as source information for this document.

Section 3.0 provides an overview of the SDPS and background information to put the SDPS requirements into context.

Section 4.0 describes the SDPS Level 4 requirements. The requirements are organized by subsystem, and by software and hardware configuration item within each subsystem.

Appendix A contains a glossary of data names used to identify the data referenced by the requirements.

Appendix B contains a sample requirements matrix showing the tracing of the Level 3 requirements to the Level 4 requirements.

Appendix C contains a sample requirements matrix showing the tracing of the Level 4 requirements to releases and to the parent Level 3 requirements.

Appendix D contains a short table showing the mapping between the requirements numbers in the December 1994 preliminary draft of the SDPS Level 4 Requirements and the numbers used in this document.

Appendix E contains tables describing processing loads associated with Data Products, and tables describing data throughput and storage volumes.

Appendix F contains a Data Type Matrix showing data type services for the various science data products, by release.

The Glossary section contains a glossary of general terms used in describing the requirements.

The Abbreviations and Acronyms section contains an alphabetical list of the abbreviations and acronyms used in this document.

## 2. Related Documentation

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### 2.1 Parent Document

The parent documents are the documents from which this SDPS Requirements Specification's scope and content are derived.

423-41-02	Goddard Space Flight Center, Functional and Performance Requirements Specification for the Earth Observing System Data and Information System (EOSDIS) Core System (ECS)
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### 2.2 Applicable Documents

The following documents are referenced within this SDPS Requirements Specification, or are directly applicable, or contain policies or other directive matters that are binding upon the content of this volume.

194-207-SE1-001	System Design Specification for the ECS Project
304-CD-001-002	Flight Operations Segment (FOS) Requirements Specification for the ECS Project, Volume 1: General Requirements
304-CD-003-002	Communications and System Management Segment (CSMS) Requirements Specification for the ECS Project
304-CD-004-002	Flight Operations Segment (FOS) Requirements Specification for the ECS Project, Volume 2: Mission Specific
194-604-OP1-001	ECS Operations Concept Document for the ECS Project, Working Draft
193-801-SD4-001	PGS Toolkit Requirements Specification for the ECS Project

### 2.3 Information Documents

The following documents are referenced herein and, amplify or clarify the information presented in this document. These documents are not binding on the content of the ECS SDPS Requirements Specification.

194-WP-904-002	Multi-Track Development for the ECS Project
194-WP-902-002	ECS Science Requirements Summary for the ECS Project

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## 3. System Description

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### 3.1 SDPS Overview

The SDPS supports the services required to ingest, process, archive, manage and access science data and related information from the entire EOSDIS. More specifically the SDPS will provide hardware, software and operations to:

- receive, process, archive and manage all data from EOS instruments and NASA Probe flight missions, other selected remotely sensed data, and their associated data products;
- receive, process, archive and manage ancillary data required by the EOSDIS algorithms
- receive, archive and manage *in situ* correlative data;
- provide the Earth science community with access to all EOS data and other Earth Science data held by the ECS and the data products resulting from research using these data;
- promote effective utilization of data for research in support of the Mission to Planet Earth (MTPE) goals, by encouraging exchange of data and research results within the science community and across the multi-agency/multi-national data collection systems and archives; and
- facilitate development, experimental usage, and community acceptance of new and/or improved algorithms for computing geophysical parameters from remotely sensed data.

Further details on these objectives are provided in ECS Science Requirements Summary White Paper (FB9402V2).

The requirements allocated to SDPS in the Functional and Performance Requirements Specification (F&PRS) for the Earth Observing System Data and Information System (EOSDIS) [423-41-02] imply a certain system structure in terms of elements (i.e., Data Archive and Distribution System (DADS), Information Management System (IMS), and Product Generation System (PGS)) and element interfaces. Following extensive interaction with the user community as part of the requirements analysis activity it became clear that the defined elements were not ideal to provide an effective system to support Global Change research. At the ECS System Design Review (SDR), a new system structure was presented, which divides the segment into seven subsystems rather than the original three elements. In addition, the original system concept, as expressed in the F&PRS, implies that SDPS services are mainly located at Distributed Active Archive Centers (DAAC) identified in the specification. Although the system is being sized and configurations are being produced for this specific distribution concept, great care is being taken in the segment design so that services can be provided by any relevant facility within EOSDIS. Thus, if policy changes different system distribution configurations can be investigated without significant changes to the architectural design. This approach supports both user desires for an extended provider capability and DAAC desires for autonomous operation.



Finally, an important feature of the system concept is its openness for collaborative development by the user community or value-added service providers (e.g., educational suppliers). An attempt has been made in all areas of the design to encourage external developments which can work in conjunction with ECS supplied components. Examples of this include:

- additional site specific services offered through the ECS infrastructure by DAACs and Science Computing Facilities (SCF).
- user community supplied methods to perform specific processing functions on data
- new versions of ECS supplied components developed externally from the ECS development activity which offer additional or more sophisticated services and can collaborate with ECS components.

This concept has been driven not only by science needs expressed in the ECS User Model, but also by the need to allow the system to smoothly evolve during the development and operational phases.

### **3.2 SDPS Software and Hardware Configuration Items**

SDPS is composed of seven subsystems. The SDPS subsystems have been divided into seventeen Computer Software Configuration Items (CSCI) and twelve Hardware Configuration Items (HWCI). The Level 4 requirements have been mapped to these Configuration Items (CI).

Figure 3.2-1 shows the SDPS subsystems, with the CSCI and HWCI of which they are composed.

### **3.3 Requirements for Incremental Development**

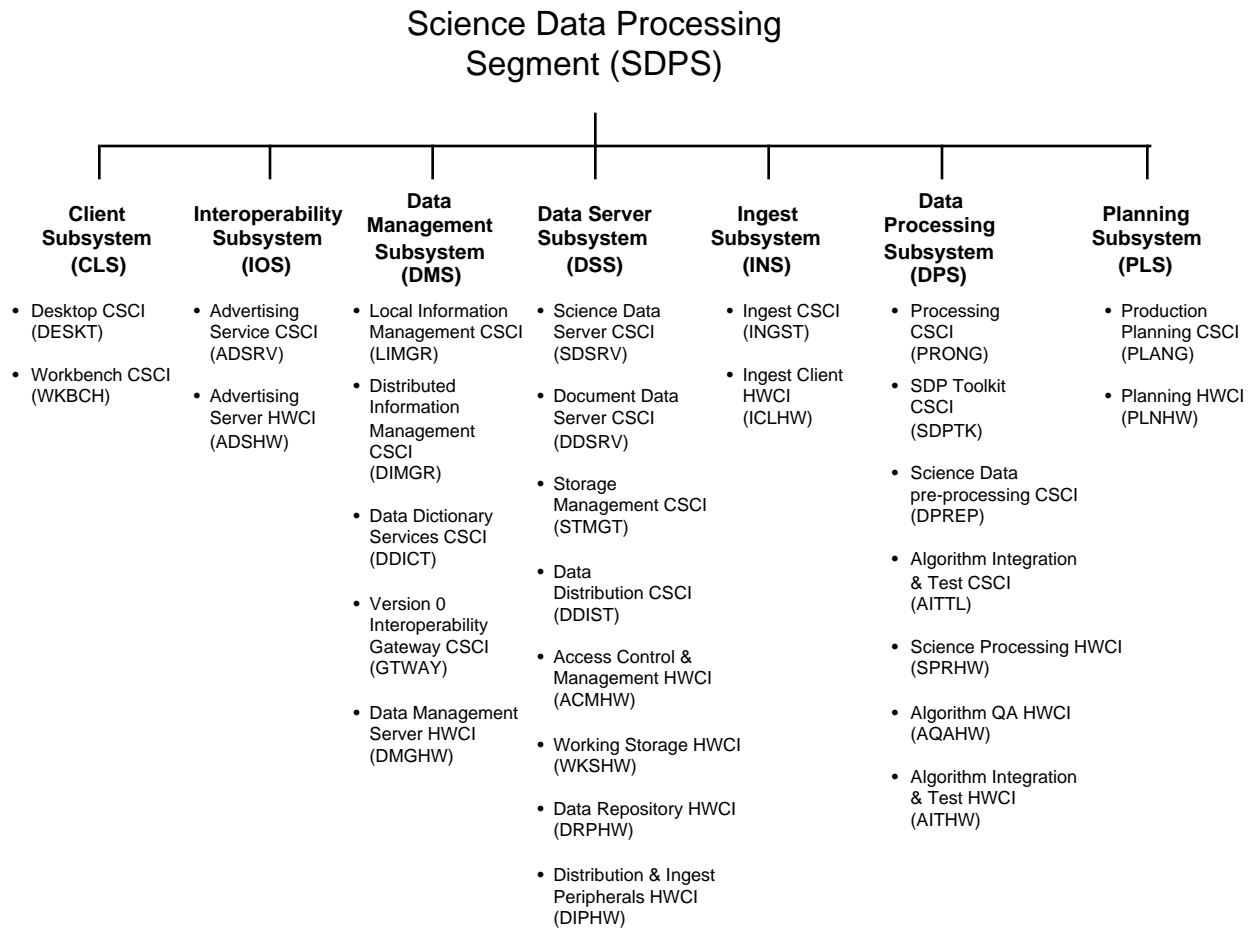
Two development approaches are being used on the ECS project: formal development and incremental development.

Formal development is characterized by relatively long development cycles (18-24 months) with formal reviews, documentation, and testing. This development approach is typically used for mission critical areas of the system. Therefore, the CIs that comprise the Data Server, Ingest, Planning, and Data Processing subsystems are being developed using the formal development approach.

Incremental development is characterized by a sequence of short development cycles (6-9 months each), with each increment building upon the previous one. It is used for areas of the system where it is desirable to obtain early user feedback and to minimize the turnaround time required to incorporate this feedback into the system.

The CIs that comprise the Client, Interoperability, and Data Management Subsystems are being developed on the incremental track. It is anticipated that user feedback will impact the Level 4 requirements; therefore, the Level 4 requirements for the Client, Interoperability, and Data Management subsystems are draft requirements. Final as-built requirements will be available after the increments are complete.

More detailed information on the ECS development approach can be found in the white paper “Multi-Track Development for the ECS Project” (FB9404V2), March 1994.



**Figure 3.2-1. SDPS Software and Hardware Configuration Items**

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## 4. Requirements

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### 4.1 CLS - Client Subsystem

The SDPS Client subsystem has three main objectives:

- provide earth science users with an interface via which they can access ECS services and data
- offer an environment into which science users can integrate their own tools
- give science programs access to the ECS services, as well as direct access to ECS data

The Client subsystem software, therefore, consists of graphic user interface (GUI) programs, tools for displaying the various kinds of ECS data (e.g., images, documents, tables), and libraries representing the client API of ECS services. Modern user interfaces are based on an object paradigm. The SDPS Client subsystem is no exception; the graphic user interface programs will follow an object oriented design. The design will be built around a core set of 'root' objects from which all other GUI software will inherit its behavior. This will lead to a consistent look and feel and reduce the amount of software that needs to be developed. This core set is called the Desktop. The remainder of the software is collectively called the Workbench.

The Client subsystem is being developed on the incremental track; therefore, the Level 4 requirements for this subsystem are draft requirements. Final as-built requirements will be available after the increments are complete.

#### 4.1.1 DESKT - Desktop CSCI

The Desktop CSCI provides capabilities for organizing and presenting the various application objects (data and programs) with which a user interfaces. The Desktop CSCI provides the following basic classes of desktop objects:

- *General Desktop Objects*—this is the root class for all desktop objects
- *Desktop Container Objects*—this is a subclass which provides for "containment" actions in general.
- *Desktop Document Objects*—this is a subclass which provides for the handling of document-like objects.
- *Desktop Application Objects*—this is a subclass which provides default behavior for objects which represent executable programs.

The Desktop CSCI also does the following:

- Supports the definition of new types of objects as subtypes of the basic desktop object classes.
- Provides for the installation of the software implementing the new object types into the desktop.

- Executes the software associated with an object in response to user input actions.
- Provides a framework for installing object format translators.

The ECS Desktop will also provide additional predefined desktop object classes (e.g., folders) as subtypes of the basic classes, in order to facilitate the organization of the desktop.

#### **4.1.1.1 Desktop Manager**

The following requirements apply to the organization of the Desktop. These include requirements for the GUI interface, Desktop utilities, and Desktop connectivity.

S-CLS-00010	The DESKT CI shall provide a GUI interface with a multiple window display.
S-CLS-00020	The DESKT CI shall provide a GUI interface with buttons and pull down menus.
S-CLS-00030	The DESKT CI shall provide a GUI interface with consistent use of non-standard keys.
S-CLS-00040	The DESKT CI shall provide a GUI interface with minimal use of non-standard keys.
S-CLS-00050	The DESKT CI shall provide a GUI interface with standardized use of commands and terminology across screens.
S-CLS-00080	The DESKT CI shall provide a GUI interface with self-explanatory, meaningful error messages.
S-CLS-00090	The DESKT CI shall provide a GUI interface with random movement of a cursor through the screen.
S-CLS-00100	The DESKT CI shall provide a GUI interface with context-sensitive help.
S-CLS-00110	The help information made available to a user shall include a general introductory description of EOSDIS and its services.
S-CLS-00120	The DESKT CI shall provide for a common default color scheme for the user interface which may be customized by the user.
S-CLS-00130	The DESKT CI shall provide for a standard ordering of menu items for the user interface.
S-CLS-00140	The DESKT CI shall provide a standard widget set for building a user interface.
S-CLS-00360	The DESKT CI shall provide users the capability to search container objects for objects which satisfy a user specified Search Criteria.
S-CLS-00370	The DESKT CI shall provide users the capability to browse the objects contained in container objects.

S-CLS-00380	The DESKT CI shall provide users the capability to display on a continuous basis the objects contained in container objects.
S-CLS-00410	The DESKT CI will provide the users the capability to list object types supported by a specific application or service class.
S-CLS-00420	The DESKT CI will provide the users the capability to list applications or service classes supported by a specific object type.
S-CLS-00430	The DESKT CI will provide the users the capability to add applications or services supported by a specific object type.
S-CLS-00440	The DESKT CI will provide the users the capability to remove applications or services supported by a specific object type.
S-CLS-00640	The DESKT CI shall provide users the capability to obtain a description of the interaction between the workbench and specified tools.
S-CLS-00790	The DESKT CI shall provide users the capability to transition from the user session currently active on the desktop to another user session, by means of a single mouse click.
S-CLS-01280	The DESKT CI shall provide a GUI interface to an information base of associations between attributes (e.g., between instruments and geophysical parameters).
S-CLS-01360	The DESKT CI shall provide users the capability to mail desktop objects
S-CLS-01570	Users shall be able to enter User Comments in a comments window directly accessible from any open window on the users desktop.
S-CLS-01600	The DESKT CI shall provide users the capability to resize windows.
S-CLS-01605	The DESKT CI shall provide users the capability to select different default screen font sizes.
S-CLS-01610	The DESKT CI shall provider users with the ability to change the default icon size.
S-CLS-01620	The DESKT CI shall provide users the ability to change the spacing of icons.

#### **4.1.1.2 Desktop Objects**

The following requirements apply to the various types of Objects on the Desktop. These include specifications for the types of objects available on the Desktop, the functionality of those objects, and the manipulation of those objects.

S-CLS-00150	The DESKT CI will provide container desktop objects.
S-CLS-00160	The DESKT CI will provide document desktop objects.

S-CLS-00170	The DESKT CI will provide application desktop objects.
S-CLS-00180	The DESKT CI will provide will provide users the capability to execute software associated with a desktop object.
S-CLS-00190	The DESKT CI shall provide users the capability to create desktop objects.
S-CLS-00200	The DESKT CI shall provide users the capability to destroy desktop objects.
S-CLS-00210	The DESKT CI shall provide users the capability to open desktop objects.
S-CLS-00220	The DESKT CI shall provide users the capability to copy the reference to objects for a desktop object.
S-CLS-00230	The DESKT CI shall provide users the capability to copy a desktop object.
S-CLS-00240	The DESKT CI shall provide users the capability to deep copy a desktop object.
S-CLS-00250	The DESKT CI shall provide users the capability to move desktop objects.
S-CLS-00260	The DESKT CI shall provide users the capability to obtain desktop object data associated with desktop objects.
S-CLS-00270	The DESKT CI shall provide users the capability to update desktop object data associated with desktop objects.
S-CLS-00280	The DESKT CI shall provide users the capability to list the available services associated with any desktop object.
S-CLS-00290	The DESKT CI shall provide users the capability to bind a service to a desktop object.
S-CLS-00295	The DESKT CI shall provide users the capability to unbind a service from a desktop object.
S-CLS-00300	The DESKT CI shall provide users the capability to invoke any service bound to a desktop object.
S-CLS-00310	The DESKT CI shall provide users the capability to generate an exchangeable (i.e., file based) form for desktop objects.
S-CLS-00320	The DESKT CI shall provide users the capability to generate a desktop object from an externalized (i.e., file-based) format.
S-CLS-00330	The DESKT CI shall provide users the capability to add desktop objects to container objects.
S-CLS-00340	The DESKT CI shall provide users the capability to remove desktop objects from container objects.

S-CLS-00350	The DESKT CI shall provide users the capability to iteratively apply operations to each of the objects in a desktop container.
S-CLS-00390	The DESKT CI will provide the capability to iconically represent desktop objects.
S-CLS-00400	The DESKT CI will provide the capability to textually represent desktop objects.
S-CLS-01550	The DESKT CI will provide the user the capability to copy ECS services onto his desktop, iconize them, and save them as desktop objects.
S-CLS-01560	The DESKT CI will provide the user the capability to access a service via the previously saved desktop object representing that service.

#### **4.1.1.3 General Desktop**

The following requirements apply to application interfaces, and requirements which span categories.

S-CLS-00450	The DESKT CI shall provide users the capability to install an application interface (i.e., an application and its parameterized interface description).
S-CLS-00460	The DESKT CI shall provide users the capability to remove an application interface.
S-CLS-00470	The DESKT CI shall provide users the capability to obtain the attributes associated with an application interface.
S-CLS-00490	The DESKT CI shall provide users the capability to modify the attributes associated with an application interface.
S-CLS-01450	Desktop objects shall utilize a <TBD> external format.
S-CLS-01460	Desktop object references shall be in <TBD> format.
S-CLS-01480	The DESKT CI will utilize an X-windows windowing interface for the GUI.
S-CLS-01500	The DESKT CI user interface shall conform to the guidelines in Version 4.0 of the ECS User Interface Style Guide (June 1, 1994).
S-CLS-01510	The DESKT CI user interface to access communications networks shall conform to the ECS style guidelines.
S-CLS-01520	The DESKT CI user interface to access to data bases that may be geographically dispersed shall conform to the ECS style guidelines.
S-CLS-01530	The DESKT CI user interface to access to multi-disciplined directories and inventories shall conform to the ECS style guidelines.



S-CLS-01540            The DESKT CI user interface to heterogeneous data sets shall conform to the ECS style guidelines.

#### **4.1.2 WKBCH- Workbench CSCI**

The Workbench CSCI provides tools for helping users to access, analyze, and disseminate data to colleagues throughout the scientific community. The Workbench CSCI provides software objects that are subtypes of the basic objects classes provided by the Desktop. The Workbench objects offer an environment for accessing and managing a user's view into the EOSDIS data and services and consist of the following:

- A collection of GUI-based tools for viewing, creating and editing ECS data objects.
- API libraries to build science applications or prepare and manipulate data.
- A collection of software objects providing the GUI interface to the ECS services, ECS data objects, and CHUI interface functions.
- ECS client support software objects which assist in the interaction between the Client Subsystem and the ECS services.

##### **4.1.2.1 User Registration**

S-CLS-12510	The WKBCH CI shall provide the user a capability to view their User Profile.
S-CLS-12520	The WKBCH CI shall provide the capability for a user to modify their User Profile information.
S-CLS-13080	The WKBCH CI shall provide users with capability to view authorized user services.
S-CLS-13090	The WKBCH CI will perform automatic registration of new users from user supplied default information.
S-CLS-13100	The WKBCH CI shall provide the user with registration approval results when new ECS user accounts are requested.
S-CLS-13110	The WKBCH CI shall provide registered users with the capability to view their user account priorities, and authorized user services.
S-CLS-13130	The WKBCH CI shall provide users Priority Information.
S-CLS-13140	The WKBCH CI shall provide users the capability to request User Profile information.
S-CLS-13420	The WKBCH CI shall provide a User Registration Request to CSMS to create a new ECS user account.
S-CLS-13430	The WKBCH CI shall provide users their user account priorities and authorized user services.

S-CLS-13440            The WKBCH CI shall provide registered users access to ECS services based on their account priorities and authorized user services.

#### **4.1.2.2 User Logon**

S-CLS-13120            The WKBCH CI shall provide users with initial system access procedures.

S-CLS-13370            The WKBCH CI shall provide the user a capability to logon.

S-CLS-13380            The WKBCH CI shall send Logon Authorization Request to CSMS.

S-CLS-13390            The WKBCH CI shall allow or deny the user system access based on User Validation Status returned from CSMS.

S-CLS-13400            The WKBCH CI shall obtain user authorization information from the user during logon.

S-CLS-13410            The WKBCH CI shall display the results of user validation to the user.

#### **4.1.2.3 User Sessions**

The following are requirements for initiating, managing, and terminating user sessions.

S-CLS-10630            The system shall provide users a Training Option

S-CLS-10640            The Training option shall consist of simulated user sessions for identifying, searching for and obtaining data and services.

S-CLS-11050            The WKBCH CI shall provide users the capability to obtain and review User Session Logs for their own sessions.

S-CLS-12500            The WKBCH CI shall provide users an interface to APIs for use in non-interactive remote user sessions.

S-CLS-12540            The WKBCH CI shall support multiple concurrent user sessions.

S-CLS-12570            The WKBCH CI shall provide users interactive user sessions.

S-CLS-12580            The WKBCH CI shall provide a user session management capability to transition between user sessions.

S-CLS-12670            The WKBCH CI shall provide users the capability to enable the logging of Service Requests, Service Request Status, and Notifications to the User Session Log.

S-CLS-12680            The WKBCH CI shall provide users the capability to disable logging to the User Session Log.

S-CLS-12690            The WKBCH CI shall provide users the capability to replay the User Session Log.

S-CLS-12700	The WKBCH CI shall provide users the capability obtain information about all their user sessions.
S-CLS-12720	The WKBCH CI shall provide users the capability to rebuild a user session context.
S-CLS-13160	The WKBCH CI shall provide users the capability to terminate user sessions with service providers.
S-CLS-13170	The WKBCH CI shall provide users the capability to initiate user sessions with service providers.
S-CLS-13180	The WKBCH CI shall provide users the capability to suspend user sessions with service providers.
S-CLS-13190	The WKBCH CI shall provide users the capability to resume suspended user sessions with service providers.
S-CLS-13200	The WKBCH CI shall provide users the capability to obtain the status information about user sessions with service providers.
S-CLS-13210	The WKBCH CI shall provide users the capability to connect to an existing user session.
S-CLS-13220	The WKBCH CI shall provide users the capability to issue Service Requests within the context of a user session.
S-CLS-13460	The WKBCH CI shall provide users the capability to create a Session Profile for each user session. The Session Profile shall be able to contain any of the parameters which are in the User Profile and which may apply as defaults to ECS Service Requests.
S-CLS-13470	The user interface shall employ the defaults specified in the Session Profile to assist the user in the formulation of a new request in the context of a user session (e.g., by displaying them as default values in the respective input fields).
S-CLS-13950	The WKBCH CI shall provide the user the capability to view the Data Requests recorded in the User Session Log.
S-CLS-14100	Externalized user sessions shall be saved in <TBD> format.

#### **4.1.2.4 Service Request Processing**

S-CLS-12550	The WKBCH CI shall support multiple concurrent Service Requests.
S-CLS-12560	The WKBCH CI shall provide the capability to save information selected in prior Metadata searches for use in subsequent Service Requests.
S-CLS-13230	The WKBCH CI shall provide users the capability to cancel any time-intensive Service Requests by issuing a Cancellation Request.

S-CLS-13240	The WKBCH CI shall provide users the capability to individually suspend and restore the Service Requests within a user session after interruption.
S-CLS-13450	Where the User Profile specifies defaults for parameters which are applicable to an ECS Service Request, the user interface shall employ these defaults to assist the user in the formulation of a new request (e.g., by displaying them as default values).
S-CLS-14250	The WKBCH CI shall provide users the capability to issue a Status Request to determine the status of any active Service Request.

#### **4.1.2.5 Mediation Services**

The following requirements apply to mediation services which are used in monitoring Service Requests and in acquiring appropriate directions from the user at key decision points.

S-CLS-12730	The WKBCH CI shall be able to accept Notifications of events associated with Service Requests or sessions.
S-CLS-12740	The WKBCH CI shall be able to display such event Notifications to the user and accept input from the user where these events require instructions from the user, e.g., when a request exceeds a client specified threshold, and provide such feedback to the service which sent the event.
S-CLS-12750	The WKBCH CI shall provide users the capability to define default instructions for such events, by type of event and session.
S-CLS-12760	The WKBCH CI shall provide users the capability to suppress the display of event Notifications if the Notifications do not require user input or if the user has defined default instructions, by type of event and session.
S-CLS-12770	The WKBCH CI shall provide users the capability to modify and remove default instructions and rescind the directive to suppress event Notification, by type of event and session.
S-CLS-12780	The WKBCH CI shall provide the default instructions defined by the user in response to an event if the user has requested that the event Notification be suppressed.

#### **4.1.2.6 Earth Science Search Tool**

The following are requirements for searching Earth Science data collections and for associated display capabilities.

S-CLS-10010	The WKBCH CI shall provide the capability for users to compose Search Requests based on product specific and core metadata attributes.
S-CLS-10020	The WKBCH CI shall provide users the capability to refine and resubmit a Search Request with additional, deleted, or changed Search Criteria.

S-CLS-10030	The WKBCH CI shall provide graphical aids to assist users in formulating Search Requests.
S-CLS-10040	The WKBCH CI shall support a Geographic Reference criteria for query of geographic Metadata.
S-CLS-10050	The WKBCH CI shall support query of geographic Metadata by data element content criteria specified in Metadata.
S-CLS-10060	The WKBCH CI shall support a minimum bounding rectangle criteria for query of geographic Metadata by text input.
S-CLS-10070	The WKBCH CI shall support point-and-radius criteria for query of geographic Metadata by text input.
S-CLS-10080	The WKBCH CI shall support polygonal coordinate criteria for query of geographic Metadata by graphical input.
S-CLS-10090	The WKBCH CI shall support query of geographic Metadata by geographic name by text input.
S-CLS-10100	The WKBCH CI shall support phrase matching criteria for query of non-geographic Metadata.
S-CLS-10110	The WKBCH CI shall support an exact word matching criteria for query of non-geographic Metadata.
S-CLS-10120	The WKBCH CI shall support substring matching criteria for query of non-geographic Metadata.
S-CLS-10130	The WKBCH CI shall provide users the capability to use boolean operators to relate query parameters for geographic and non-geographic Metadata.
S-CLS-10140	The WKBCH CI shall support wildcard construct (prefix, embedded, suffix) matching criteria for query of non-geographic Metadata.
S-CLS-10150	The WKBCH CI shall support character range matching criteria for query of non-geographic Metadata.
S-CLS-10160	The WKBCH CI shall support logical and boolean operators matching criteria for query of non-geographic Metadata.
S-CLS-10170	The WKBCH CI shall support min/max range Search Criteria for query of numerical non-geographic Metadata.
S-CLS-10180	The WKBCH CI shall support any combination of exact word match, exact phrase match, character set, wildcard, character range, logical and boolean operator, and min/max range Search Criteria for query of non-geographic Metadata.

S-CLS-10190	The WKBCH CI shall provide the capability for users to compose searches across multiple data sets for coincident occurrences of data in space, time, or any other Metadata attribute(s).
S-CLS-10290	The WKBCH CI shall provide users the capability to browse data in ECS supported visualization formats in a window during the data selection and acquisition process,
S-CLS-10300	The WKBCH CI shall provide <TBD> visual overlays to aid in the selection of spatial data and to enhance the display of Metadata.
S-CLS-10390	The WKBCH CI binaries that run on ECS supported workstations shall be publicly available.
S-CLS-10710	The WKBCH CI shall provide the registered user the capability to obtain ECS data and services.
S-CLS-10720	The WKBCH CI shall provide the user the capability to search for data and services supported by ECS.
S-CLS-10730	The WKBCH CI shall provide users the capability to search data dictionary information to obtain the precise definitions of terms used within ECS.
S-CLS-10740	The WKBCH CI shall provide access to guide information in ECS supported document formats.
S-CLS-10750	The WKBCH CI shall provide users a search and results interface to search for and view Inventory information.
S-CLS-10770	The WKBCH CI shall support hierarchical searching of documents in HTML format.
S-CLS-10780	The WKBCH CI shall list Dependent Valid Values to assist users in formulating Search Requests.
S-CLS-10850	The WKBCH CI shall provide users the capability to submit Metadata problem reports.
S-CLS-10910	The WKBCH CI shall provide users the capability to transparently search across any combination of Data Servers for stored EOSDIS Data Granules.
S-CLS-10930	The WKBCH CI shall provide users the capability to search inventory based on any combination of the inventory core metadata attributes and inventory product specific metadata attributes.
S-CLS-10940	The WKBCH CI shall provide informational messages to users to indicate that a query is being executed.
S-CLS-11290	The WKBCH CI shall provide a capability to translate user input Search Criteria into ECS internal query language.

S-CLS-12480	The DESKT CI shall provide the capability to request any of the services available for the individual items in the output of a Metadata search.
S-CLS-13480	Users shall be able to save Search Request parameters at any time during the formulation of the Search Request.
S-CLS-13490	Users shall be able to retrieve any previously saved Search Request parameters into a new Search Request, edit the parameters, save the modified parameters, and/or submit the new Search Request.
S-CLS-13500	Users shall be able to save the results of Search Requests.
S-CLS-13510	Users shall be able to retrieve saved Search Results, delete items from the Search Result, and save the modified result.
S-CLS-13520	Users shall be able to save selected portions of a Search Result.
S-CLS-13530	Users shall be able to combine Search Results.
S-CLS-13540	Users shall be able to select Data Granules from multiple saved Search Results and submit a single Data Request for these Data Granules.
S-CLS-13550	The WKBCH CI shall provide users the capability to search Production History on any combination of Production History Metadata attributes.
S-CLS-13560	The WKBCH CI shall allow users to search the holdings of ECS using Phenomenological Search Criteria for attributes supported by Data Server Schema.
S-CLS-13570	The user shall be able to indicate a spatial search criterion by drawing a polygon on a displayed map overlay.
S-CLS-13580	The WKBCH CI shall provide users the capability to graphically represent data availability for products(s) vs. time.
S-CLS-13590	The WKBCH CI shall provide users the capability to graphically view the temporal extent of Data Granules.
S-CLS-13710	The WKBCH CI shall provide users the capability to display on a coverage map the geographic coverage of Data Granules.
S-CLS-13720	Users shall be able to select Data Granules displayed on a coverage map for delivery.
S-CLS-13730	Users shall be able to request an update of the status of a previously submitted Search Request.
S-CLS-13740	Users shall be able to request that the workbench poll the status of a Search Request at a user selectable time interval.

S-CLS-13970	The WKBCH CI shall provide users the capability to display the Workbench selection map in either a flat equatorial projection, or north or south polar projections.
S-CLS-13990	The WKBCH CI shall provide users the capability to view resulting coverage on a map when a lat/lon selection is typed in for a search.
S-CLS-14020	The WKBCH CI shall list Dependent Valid Values associated with search screens to show current Valid Values, as the parameterization of the search is changed.
S-CLS-14480	Time-related data for a Product Request will be synchronized so that selection of a time range on a Product Request timeline tool will be translated into date/time ranges in a Product Request submission window.
S-CLS-14490	Time-related data for a Product Request will be synchronized so that a date/time range typed in a Product Request window will be graphically display as a blocked out time range on a Product Request timeline window.
S-CLS-14500	Geographic selection criteria for a Product Request will be synchronized so that selection of an area on a Product Request map display will be translated into lat/lon coordinates in a Product Request submissions window.
S-CLS-14510	Geographic selection criteria for a DAR will be synchronized so that typed lat/lon coordinates in a Product Request submission window will be graphically displayed as a blocked out area on a Product Request map display.

#### **4.1.2.7 Document Search Tool**

The following requirements are for capabilities that support document queries. This will be supported through search and viewing capabilities in an HTML package.

S-CLS-10620	The WKBCH CI shall provide users the capability to view documentation ingested in any supported document format.
S-CLS-10840	The WKBCH CI shall provide the ability for terminals with HTML viewers to access guide information in HTML format which includes graphics and hypertext.
S-CLS-12900	The WKBCH CI shall provide users a capability to store documents at his local workstation.
S-CLS-13690	Users shall be able to navigate through guide documentation in a hyper-text fashion, where guide documentation has been created in the appropriate format.



#### 4.1.2.8 Product Request Tool

The following requirements apply to product ordering. These cover the formation of order lists, what may be requested, modes of ordering, and order confirmation and rejection.

S-CLS-10220	The WKBCH CI shall allow users to formulate a Data Request based on the results of searching the inventory core metadata attributes and inventory product specific metadata attributes.
S-CLS-10230	The WKBCH CI shall provide the capability for users to preview billing costs for non-EOSDIS Data Products prior to Data Request submission.
S-CLS-10240	The WKBCH CI shall provide the capability for users to request subsetted, subsampled, and summary products.
S-CLS-10250	The WKBCH CI shall automatically provide the user an estimate of how long it will take before products are ready for delivery.
S-CLS-10260	The WKBCH CI shall provide the capability for users to issue Data Requests for Data Products that are generated on demand.
S-CLS-10800	The WKBCH CI shall provide users the capability to specify electronic distribution of data (i.e., over a network) in Electronic Distribution Requests.
S-CLS-10810	The WKBCH CI shall provide users the capability to specify off-line distribution of data (i.e., hardcopy or off-line data media) in Media Distribution Requests, as available from specific Data Servers.
S-CLS-10860	The WKBCH CI shall provide users the capability to display processing schedules.
S-CLS-10960	The WKBCH CI shall provide the capability for users to generate Distribution Requests for the one-time distribution of ECS data.
S-CLS-10990	The WKBCH CI shall provide users the capability to specify the content of Data Requests.
S-CLS-11010	The WKBCH CI shall automatically provide the capability to confirm or reject a Data Request.
S-CLS-11020	The WKBCH CI shall provide users Data Request Status at the conclusion of the processing of a Data Requests.
S-CLS-11030	The WKBCH CI shall provide the capability for users to determine reprocessing status of products which are being reprocessed.
S-CLS-11040	The WKBCH CI shall provide users the capability to obtain Service Request Status during the processing of a Service Request initiated by the user.

S-CLS-11060	The WKBCH CI shall provide science users the capability to obtain Distribution Request Status for user-initiated Distribution Requests.
S-CLS-11070	The WKBCH CI shall provide science users the capability to obtain Data Request Status for ADC Data Products.
S-CLS-11130	The WKBCH CI shall provide the capability for users to construct and submit Production Requests.
S-CLS-11140	The WKBCH CI shall provide the capability for users to update Distribution Requests prior to the shipment of Data.
S-CLS-11150	The WKBCH CI shall provide product delay notification to users to notify them when products will not be distributed within the estimated time.
S-CLS-11160	The WKBCH CI shall provide users the capability to request priority processing of Production Requests.
S-CLS-11170	The WKBCH CI shall display to users a processing status message to confirm or reject a Production Request.
S-CLS-11190	The WKBCH CI shall provide the capability for users to submit a Conflict Adjudication Request to the SMC, in the event a processing conflict cannot be resolved between the SDSRV CI, the science user, and the Data Processing Subsystem.
S-CLS-11200	The WKBCH CI shall provide users a Conflict Adjudication Response from the SMC after submitting a Conflict Adjudication Request.
S-CLS-11210	The WKBCH CI shall provide users a Notification when processing will not be completed within the estimated time.
S-CLS-11220	The WKBCH CI shall provide the capability for users to issue Production Requests for the ad-hoc processing of subsetted, subsampled, and summary products based on geographical location (x, y, z - spatial with rectangular boundaries).
S-CLS-11230	The WKBCH CI shall provide the capability for users to issue Production Requests for the ad-hoc processing of subsetted, subsampled, and summary products based on spectral band.
S-CLS-11240	The WKBCH CI shall provide the capability for users to issue Production Requests for the ad-hoc processing of subsetted, subsampled, and summary products based on time.
S-CLS-13600	The WKBCH CI shall display the cost estimates for Data specified in Distribution Requests prior to the submission of the Search Request.
S-CLS-13610	When users submit a Distribution Request, they shall be given an opportunity to review the total amount that will be billed for the order and affirm, cancel or modify the Search Request.

S-CLS-13780	When submitting Distribution Requests, users shall be able to request inclusion of Universal References to the appropriate documentation for this data, the tools needed to read this data, and an ASCII file describing each of these references.
S-CLS-14030	The WKBCH CI shall provide users the capability to retrieve any previously saved Data Request parameters into a new Data Request, edit the parameters, save the modified parameters, and/or submit the new Data Request.
S-CLS-14230	The DESKT CI shall provide the capability for a user to issue a Distribution Status Request for a previously submitted Distribution Request and receive Distribution Request Status as a result.
S-CLS-14240	The DESKT CI shall issue periodic Distribution Status Requests for a user-specified Distribution Request, at time intervals specified by the user.

#### **4.1.2.9 General Workbench**

S-CLS-10200	The WKBCH CI shall provide users the capability to search and view a product's processing history.
S-CLS-10880	The WKBCH CI shall provide users the capability to display documentation on data formats and Metadata standards.
S-CLS-10890	The WKBCH CI shall provide users the capability to display ESDIS Project Policies and Procedures.
S-CLS-12060	The WKBCH CI shall provide a GUI interface with automatic acronym expansion, which can be enabled and disabled interactively.
S-CLS-12070	The WKBCH CI shall provide a GUI interface with capability to save and restore the contents of menus and data input forms.
S-CLS-12110	The WKBCH CI shall provide a GUI interface with a command language.
S-CLS-12530	The WKBCH CI shall provide users the capability to simultaneously view Search Results and Production Requests.
S-CLS-12800	The WKBCH CI library shall provide a capability to interactively display interrupt messages.
S-CLS-12910	The user interface shall not require changes as a result of restructuring any of the data bases provided by the SDSRV CI.
S-CLS-12920	The WKBCH CI shall provide an option for Expert level of user interaction.
S-CLS-12930	The Expert level of interaction shall provide command driven direct information input with no automatically supplied help.

S-CLS-12940	The WKBCH CI shall provide an option for Intermediate level of user interaction.
S-CLS-12950	The Intermediate level of interaction shall provide prompting and automatically supplied help.
S-CLS-12960	The WKBCH CI shall provide a Novice level of user interaction.
S-CLS-12970	The Novice level of interaction shall provide extensive prompting and help facilities.
S-CLS-12980	The user interface shall not require changes as a result of restructuring any of the data bases provided by the DDICT CI.
S-CLS-12990	The user interface shall not require changes as a result of restructuring any of the data bases provided by the ADSRV CI.
S-CLS-13060	The WKBCH CI shall provide the user the capability to view the service availability status of all ECS services.
S-CLS-13270	The WKBCH CI shall provide a GUI interface with Valid Value lists for all variables.
S-CLS-13680	The WKBCH CI shall allow users to access the Data Dictionary Service.
S-CLS-14000	The WKBCH CI shall provide a user interface that indicates changes in status of an iconified window (e.g., additional results inserted into window).
S-CLS-14010	The WKBCH CI shall prompt the user to save his/her edits when the user quits the editing of workbench objects (e.g., a Result Set or a Guide document), if there are any unsaved edits.
S-CLS-14040	The WKBCH CI shall automatically add the date, time and client release version identification to User Comments.
S-CLS-14520	For WKBCH CI screens requiring user input, optional fields will be distinguished from mandatory fields.

#### **4.1.2.10 Advertising Client**

The following requirements concern capabilities for accessing the Advertising Service. These include search capabilities, modes of access, subscriptions, and documentation handling not covered in the Document Search Tool.

S-CLS-10210	The WKBCH CI shall provide users the capability to search for Science Processing Library holdings
S-CLS-10650	The WKBCH CI shall provide the user the capability to identify Data and services provided by ECS.
S-CLS-10660	The WKBCH CI shall provide users the capability to access Advertisements.

S-CLS-10670	The WKBCH CI shall provide unregistered users the capability to browse public Advertisements.
S-CLS-10680	The WKBCH CI shall provide users the capability to access descriptions of providers in the advertising service.
S-CLS-10690	The WKBCH CI shall provide users the capability to access Advertisements describing non-ECS data and services.
S-CLS-10700	The WKBCH CI shall provide the user the capability to locate non-ECS data and services interoperable with ECS.
S-CLS-10760	The WKBCH CI shall provide users a capability to submit documents for storage in the ECS.
S-CLS-10820	The WKBCH CI shall provide users the capability to access guide information as plain text documents for terminals without graphics capability.
S-CLS-10830	The WKBCH CI shall provide the capability to access and present guide information as ASCII text documents.
S-CLS-10970	The WKBCH CI shall provide the capability for the user to request standard product software and associated documentation to be distributed on-line.
S-CLS-10980	The WKBCH CI shall provide the capability for the user to request standard product software and associated documentation to be distributed off-line (i.e., media).
S-CLS-11180	The WKBCH CI shall provide users the capability to acquire Science Processing Library holdings.
S-CLS-11285	The WKBCH CI shall provide users the capability to create documents in HTML format.
S-CLS-11295	The WKBCH CI shall provide users the capability to create and submit Advertisements.

#### **4.1.2.11 EOSView**

The following requirements concern the visualization of data. These apply to coordinate systems, display capabilities, viewing effects, and visualization capabilities.

S-CLS-10310	The WKBCH CI shall provide users the capability of positioning the cursor by entering an image X,Y coordinate.
S-CLS-10320	The WKBCH CI shall provide users the option to display Latitude/Longitude pairs as symbols, displayed in their proper geolocation on all visualizations produced by the WKBCH CI.

S-CLS-10330	The WKBCH CI shall provide users the capability of displaying 8-bit raster images.
S-CLS-10340	The WKBCH CI shall provide users the capability of displaying 24-bit raster images.
S-CLS-10350	The WKBCH CI shall provide users the option to display a series of Latitude/Longitude pairs as lines, displayed in their proper geolocation on top of all visualizations produced by the WKBCH CI.
S-CLS-10360	The WKBCH CI shall provide users the capability to display browse information in table format.
S-CLS-10370	The WKBCH CI shall provide users the capability to display browse information in text format.
S-CLS-10380	The WKBCH CI shall provide users the capability to produce an animation of a browse movie loop.
S-CLS-10400	The WKBCH CI shall provide users the option to display a series of visualizations as an animation.
S-CLS-10410	The WKBCH CI shall provide the capability of displaying ECS supported visualization data as a two-dimensional color scatter plot.
S-CLS-10420	The WKBCH CI shall provide the capability of selecting different color palettes for the pseudocolor visualizations.
S-CLS-10430	The WKBCH CI shall provide the capability of displaying two-dimensional data arrays as pseudocolor images.
S-CLS-10440	The WKBCH CI shall provide the capability of zooming and panning pseudocolor visualizations of data.
S-CLS-10450	The WKBCH CI shall provide the capability of zooming and panning raster images.
S-CLS-10460	The WKBCH CI shall provide users Lat/Long lists for the production of built-in vector overlays as part of the application.
S-CLS-10470	The WKBCH CI shall provide users the capability to display browse information in vector graphic format.
S-CLS-10480	The WKBCH CI shall provide the capability of displaying ECS supported visualization data as a series of lineplots.
S-CLS-10490	The WKBCH CI shall provide the capability of displaying a horizontal or vertical profile through a pseudocolor image.

S-CLS-10500	The WKBCH CI shall provide the capability of displaying multi-dimensional arrays of data as a series of two-dimensional pseudocolor images.
S-CLS-10510	The WKBCH CI shall provide the capability of importing color palettes.
S-CLS-10520	The WKBCH CI shall provide the capability for modifying the color palette.
S-CLS-10530	The WKBCH CI shall provide the capability of modifying the pseudocolor mapping by changing the data min/max values.
S-CLS-10540	The WKBCH CI shall provide the capability of modifying the pseudocolor mapping by adaptive equalization.
S-CLS-10550	The WKBCH CI shall provide users the capability of calculating summarizing statistics of multi-dimensional arrays of EOS data.
S-CLS-10560	The WKBCH CI shall provide the capability of calculating summarizing statistics of user-selected columns from tables of values of EOS data.
S-CLS-10570	The WKBCH CI shall produce visualizations of images needed for QA, validation, Algorithm development, calibration functions, parameter verification and anomaly detection.
S-CLS-10580	The WKBCH CI shall produce visualizations of multi-dimensional arrays needed for QA, Validation, Algorithm development, calibration functions, parameter verification and anomaly detection.
S-CLS-10590	The WKBCH CI shall produce visualizations of tables of numbers needed for QA, Validation, Algorithm development, calibration functions, parameter verification and anomaly detection.
S-CLS-10600	The WKBCH CI shall display the Latitude and Longitude coordinates of the cursor, when the cursor is inside an EOS Grid array.
S-CLS-10610	The WKBCH CI shall provide users the capability of positioning the cursor by entering a Latitude/Longitude value.
S-CLS-13620	The WKBCH CI shall provide the capability to visualize Data Products as continuous forward animation.
S-CLS-13630	The WKBCH CI shall provide the capability to visualize Data Products as single step forward animation.
S-CLS-13640	The WKBCH CI shall provide the capability to visualize Data Products as single step backward animation.
S-CLS-13650	The WKBCH CI shall provide the capability to visualize Data Products as oscillating animation (i.e., continuous forward then continuous backward, alternating throughout the loop until user-directed termination).

S-CLS-13660	The WKBCH CI shall provide users the capability to change the minimum/maximum values of the color tables for visualization of Data Products.
S-CLS-13670	The WKBCH CI shall provide users the capability to modify color palettes for visualization of Data Products.
S-CLS-13700	Overlays provided for display to users shall be continuous over the entire display area, regardless of any gaps in the science data, for data following HDF-EOS geolocation conventions.
S-CLS-13980	The WKBCH CI shall provide a legend describing the display of a Data Product, in each window in which a Data Product is displayed.

#### **4.1.2.12 Subscription Services**

Subscription services allow a user to specify an interest in changes in the capabilities or data offered by an ECS service, and to specify an action to be taken when those changes occur.

S-CLS-10280	The WKBCH CI shall provide users the capability to create, cancel, renew, update and list the contents of Subscriptions, including standing requests.
S-CLS-10950	The WKBCH CI shall provide the capability for users to submit Subscription Requests for periodic delivery of data described by Advertisements.
S-CLS-11000	The WKBCH CI shall provide the capability to submit Subscription Requests for on-demand processing of ECS data by pre-existing processes.
S-CLS-11250	The WKBCH CI shall provide a capability to submit Subscription Requests for the distribution of ECS data.
S-CLS-11260	The WKBCH CI shall provide the capability for users to update Subscriptions for the distribution of ECS data.
S-CLS-11270	The WKBCH CI shall provide users the capability to terminate their Subscriptions for on demand processing.
S-CLS-11280	The WKBCH CI shall provide users the capability to modify their Subscriptions for on demand processing.
S-CLS-13750	The WKBCH CI shall provide users the capability to submit Subscription Requests which request a periodic search for new documents meeting user specified search conditions. All search conditions supported by the document search user interface shall be allowed in this context.
S-CLS-13760	The WKBCH CI shall provide users the capability to issue a Subscription Request for revisions of a given document.
S-CLS-13770	The WKBCH CI shall provide users the capability to issue a Subscription Request for new documents, based on topical keywords.



S-CLS-13810            The WKBCH CI shall accept Service Requests for Subscriptions for Data.

#### **4.1.2.13 Data Acquisition Requests**

These requirements concern the handling of Data Acquisition Requests (DARs). The format of a DAR is specified in Appendix A.

S-CLS-10870            The WKBCH CI shall provide users the capability to display data acquisition plans and schedules.

S-CLS-13250            The WKBCH CI shall provide users the capability to view DAR generation information during the DAR planning and submittal process.

S-CLS-13790            The WKBCH CI shall provide users the capability to parameterize ASTER DARS with ASTER DAR Parameters.

S-CLS-13800            The WKBCH CI shall provide the capability for users to construct a Subscription Request associated with a Data Acquisition Request.

S-CLS-13820            The WKBCH CI shall accept Service Requests for changes to existing DARs from the science user.

S-CLS-13830            The WKBCH CI shall make ASTER data acquisition schedules and plans accessible to authorized users on request.

S-CLS-13840            The WKBCH CI shall display data acquisition schedules as timelines.

S-CLS-13850            The WKBCH CI shall provide users the capability to access the Guide during DAR formulation and submittal.

S-CLS-13860            The WKBCH CI shall provide EOS-AM spacecraft location projections as an reference aid to the creation of ASTER Data Acquisition Requests

S-CLS-13870            The WKBCH CI shall provide visualizations of ASTER instrument nominal view swaths and non-nominal view swaths based on user supplied angle as an reference aid to the creation of ASTER DARs.

S-CLS-13880            The WKBCH CI shall provide instrument specific default settings for DAR instrument configurable parameters.

S-CLS-13890            The WKBCH CI shall provide users the capability to view Valid Values for DAR Parameters.

S-CLS-13900            The WKBCH CI shall constraint check and validate DAR Parameters.

S-CLS-13920            The WKBCH CI shall provide DAR Disposition in response to the submittal of a DAR. This may be e-mail notification.

S-CLS-13930            The WKBCH CI shall be expandable to make accessible to authorized users the current data acquisition schedules and plans for U.S. instruments on foreign spacecraft for the IP Information Management System or an equivalent IP facility.

S-CLS-13940	The WKBCH CI shall display DAR status when requested by users.
S-CLS-13960	The WKBCH CI shall provide the user the capability to view the DARs recorded in the User Session Log.
S-CLS-14400	Time-related data for DARs will be synchronized so that selection of a time range on a DAR timeline tool will be translated into date/time ranges in a DAR submission window.
S-CLS-14410	Time-related data for DARs will be synchronized so that typing a date/time range in a DAR submission window will be graphically display as a blocked out time range on a DAR timeline window.
S-CLS-14420	Geographic selection criteria for DARS will be synchronized so that selection of an area on a DAR map display will be translated into lat/lon coordinates in a DAR submissions window.
S-CLS-14430	Geographic selection criteria for DARs will be synchronized so that typing lat/lon coordinates in a DAR submission window will be graphically displayed as a blocked out area on a DAR map display.
S-CLS-14440	The WKBCH CI shall provide users the capability to retrieve any previously saved DAR parameters into a new DAR, edit the parameters, save the modified parameters, and/or submit the new DAR.
S-CLS-14450	The WKBCH CI shall provide the capability for users to construct a Product Request associated with a DAR.
S-CLS-14460	The WKBCH CI shall make spacecraft schedules accessible to authorized users on request.
S-CLS-14470	The WKBCH CI shall display spacecraft schedules as timelines.

#### **4.1.2.14 Access to Communication Services**

The following requirements apply to providing users access to communication services.

S-CLS-13310	The WKBCH CI shall provide access to ESN file transfer communication services.
S-CLS-13320	The WKBCH CI shall provide access to ESN remote log-on communication services.
S-CLS-13330	The WKBCH CI shall provide access to ESN multi-media mail communication services.
S-CLS-13340	The WKBCH CI shall provide access to ESN access to other networks.
S-CLS-13350	The WKBCH CI shall provide access to an ESN Electronic Bulletin board.
S-CLS-13352	The WKBCH CI shall provide access to USENET newsgroups.

S-CLS-13354            The WKBCH CI shall provide a WAIS client.

#### **4.1.2.15 User Comments**

These requirements apply to the collection and access of user feedback information.

S-CLS-14200            The WKBCH CI shall provide the capability to retrieve User Comments based on author, subject and date/time.

S-CLS-14210            The WKBCH CI shall forward User Comments to SMC.

#### **4.1.2.16 SMC Interface**

These requirements apply to the interface between the WKBCH CI and the SMC.

S-CLS-11100            The WKBCH CI shall accept from the users user feedback information, on product data quality assessment and output it to the SMC.

S-CLS-11110            The WKBCH CI shall accept from the users user feedback information, on schedule performance assessment and output it to the SMC.

S-CLS-11120            The WKBCH CI shall accept from the users user feedback information, on ECS service quality evaluation and output it to the SMC.

#### **4.1.2.17 Command Language Interface**

The following requirements describe the application program interfaces to the WKBCH CI.

S-CLS-12810            The WKBCH CI shall provide a dumb terminal interface with minimal and consistent use of non-standard keys.

S-CLS-12820            The WKBCH CI shall provide a dumb terminal interface with capability to save and restore the contents of a menu or form.

S-CLS-12830            The WKBCH CI shall provide a dumb terminal interface with standardized use of commands and terminology across screens.

S-CLS-12840            The WKBCH CI shall provide a dumb terminal interface with self-explanatory, meaningful error messages.

S-CLS-12850            The WKBCH CI shall provide a dumb terminal interface with availability of a menu tree diagram.

S-CLS-12860            The WKBCH CI shall provide a dumb terminal interface with a command language.

S-CLS-12870            The WKBCH CI shall support a dumb terminal interface that provides users system access from local and remote dumb terminals.

S-CLS-12880            The WKBCH CI shall support a dumb terminal interface that provides users system access from local and remote bitmapped-display terminals.

S-CLS-12890	The WKBCH CI shall provide a dumb terminal interface with context-sensitive help.
S-CLS-13260	The WKBCH CI shall provide a dumb terminal interface with Valid Value lists for all attributes.
S-CLS-13265	The WKBCH CI Subsystem shall provide CHUI terminal support conforming to VT-100 standards.
S-CLS-13290	The WKBCH CI shall provide a dumb terminal interface with an information base of associations between variables (e.g., between instruments and geophysical parameters).
S-CLS-13300	The WKBCH CI shall provide users the capability to access guide information as plain text documents for dumb terminals.

#### **4.1.2.18 Application Program Interface**

The following requirements describe the application program interfaces to the WKBCH CI.

S-CLS-13000	The WKBCH CI application program interfaces will be configuration controlled.
S-CLS-13010	The WKBCH CI shall provide application program interfaces that will support development of extensions for support of data visualization utilities for DAAC-specific products.
S-CLS-13020	The WKBCH CI shall provide application program interfaces that will support development of extensions for support of DAAC-specific data analysis utilities.
S-CLS-13030	The WKBCH CI shall provide application program interfaces that will support development of DAAC-specific data analysis utilities.
S-CLS-13040	The WKBCH CI shall provide application program interfaces that will support development of a local user interface client accessing DAAC-unique Metadata searching services.
S-CLS-13045	The WKBCH CI shall provide application program interfaces which support the construction of product Metadata entries in a format suitable for submission to Science Data Servers.
S-CLS-13050	The WKBCH CI shall provide application program interfaces that will be capable of supporting the development of a local user interface that can bypass the delivered ECS user interface for accessing DAAC-unique Metadata searching services.

#### 4.1.2.19 Accounting

The following requirements apply to the accounting of costs associated with ECS services.

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| S-CLS-11080 | The WKBCH CI shall provide the capability for users to obtain their current account balance.                                |
| S-CLS-11090 | The WKBCH CI shall provide the capability display account balance status reports which reports on a user's account balance. |

## 4.2 IOS- Interoperability Subsystem

SDPS is architected as a collection of distributed applications. They need support by distributed operating system and communications services that are part of the Communications and System Management Segment (CSMS) and are described in the CSMS Design Specification [305-CD-003-001]. To these functions, the SDPS Interoperability Subsystem adds an Advertising Service. It maintains a database of information about the services and data offered by ECS, and allows users to search through this database to locate services and data that may be of interest to them. The Advertising Service will be implemented as an SDPS developed distributed database application on top of a commercial off-the-shelf DBMS.

The Interoperability subsystem is being developed on the incremental track; therefore, the Level 4 requirements for this subsystem are draft requirements. Final as-built requirements will be available after the increments are complete.

### 4.2.1 ADSRV- Advertising Service CSCI

The Advertising Service CSCI provides the interfaces needed to support interactive browsing and searching of advertisements as required by the Client Subsystem. Although there will be a single format for submitting advertisements to the service, they will be accessible in several different formats and via several different interfaces to support database searching, text searching, and hyper linked access and retrieval according to several different viewing styles (e.g., ASCII text, interactive form, or HTML document).

The attributes reflected in the advertising service are a subset of the directory-level attributes available at a Data Server. Queries for directory information, therefore, can also be sent directly to a Data Server if their scope is sufficiently narrow. For example, a user who wishes to find out what data sets are available on the network would search or browse the advertising information; more detailed directory level information such as overall parameter accuracy specification would be obtained from the directory information held by the Data Server. Both types of 'directory searching' are available on the user's desktop; the user can choose whichever approach is most convenient in the current work context.

The Advertising Service supports management of and access to the following:

- *Advertisements*—The services provided by providers are described in advertisements. client programs can search, browse, and retrieve service descriptions.

- *Subscriptions*—Users can subscribe to changes in advertisements by submitting subscription requests which define the types of advertising changes in which a user is interested.
- *Definitions of service classes*—A service class must be defined in the Advertising Service before services of that type can be advertised. The service also manages the Schema for the advertisements of each class.
- *Provider information*—The Advertising Service will maintain a list of providers. A provider may offer one or several services, however, a service can not be offered unless the provider is registered with the advertising service.

#### 4.2.1.1 General

These requirements cover the basic capabilities of the Advertising Service, the views available through Advertising, connectivity, and interactive subscription support.

Basic capabilities of the Advertising Service.

S-IOS-00010	The ADSRV CI shall provide the capability for viewing Advertisements.
S-IOS-00020	The ADSRV CI shall support interactive information management capabilities for users to retrieve information.
S-IOS-00030	Advertising shall contain information that describes EOSDIS science data sets.
S-IOS-00040	The ADSRV CI shall use the identification of the user on whose behalf a Service Request is issued as the basis for access control decisions.
S-IOS-00050	Advertising accesses to data shall be subject to access controls of read, write, update and delete, singly or in combination, based on user privileges.
S-IOS-00070	The ADSRV CI shall provide capability for displaying Advertisements for data and services provided by non-ECS systems with which ECS is interoperable.
S-IOS-00080	The ADSRV CI shall provide a capability to access Advertisements for ECS and non-ECS data and services.
S-IOS-00330	The ADSRV CI shall support the interruption of any administrative or maintenance activity and its restart without loss of information.
S-IOS-00590	The ADSRV CI shall provide Advertisements that describe Science Processing Library holdings.
S-IOS-00600	The ADSRV CI shall provide the clients with a binding to the advertisement which can be used to issue Service Requests to the selected service or use the reference to the service in a Universal Reference

S-IOS-00610	The ADSRV CI shall find Advertisements which match text string expressions in the Service Request
S-IOS-00620	The ADSRV CI shall access Advertisements via hyperlink mechanism in support of browsing Advertisements and linking to data Dictionary definitions of terms
S-IOS-00630	The ADSRV CI shall provide a capability to link advertising data to data dictionary definitions of terms
S-IOS-00640	The ADSRV CI shall support interactive information management capabilities for users to add a Subscription to be informed of changes in the Advertisements.
S-IOS-00650	The ADSRV CI shall support interactive information management capabilities for users to cancel a Subscription
S-IOS-00660	The ADSRV CI shall support Subscription Update Requests.
S-IOS-00670	The ADSRV CI shall be capable of obtaining the current Subscription Notification.
S-IOS-00680	The ADSRV CI shall provide attributes of the identified Subscription(s) in the format specified by the output specifications, e.g., as text document(s), hyperlink document(s) or a set of data records
S-IOS-00780	Advertising shall contain information that describes EOSDIS science data sets.

#### **4.2.1.2 Advertising Database Management**

These requirements concern the Advertising Service internal databases, and cover the capability to create and update advertisements.

S-IOS-00060	Advertising internal data base management queries shall be expressed in <TBD> standard query language
S-IOS-00190	The ADSRV CI shall support interactive information management capabilities for users to add information.
S-IOS-00200	The ADSRV CI shall support interactive information management capabilities for users to update information.
S-IOS-00210	The ADSRV CI shall support interactive information management capabilities for users to delete information.
S-IOS-00230	The ADSRV CI shall provide the capability to add, delete, or modify individual Advertisements.

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| S-IOS-00250 | The ADSRV CI shall support interactive information management capabilities for authorized users to renew an existing advertisement before it expires |
| S-IOS-00260 | The ADSRV CI shall support interactive information management capabilities for users to replace an existing advertisement with an updated version    |

#### **4.2.1.3 Advertising Administration**

The following are requirements for administration utilities and update logging.

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| S-IOS-00090 | The ADSRV CI shall support an administration utility for performance monitoring of system CPU, memory, disk and I/O.                |
| S-IOS-00100 | The ADSRV CI shall support an administration utility for performance monitoring of database query processing.                       |
| S-IOS-00110 | The ADSRV CI shall support an administration utility for performance tuning.  |
| S-IOS-00120 | The ADSRV CI shall support an administration utility for administration of access control.  |
| S-IOS-00130 | The ADSRV CI shall support an administration utility for on-line full backup and restoration of advertising service data.           |
| S-IOS-00140 | The ADSRV CI shall support an administration utility for on-line incremental backup and restoration of advertising service data.    |
| S-IOS-00150 | Advertising shall support an administration utility for manual recovery of advertising service data from media and system failures. |
| S-IOS-00160 | The ADSRV CI shall support an administration utility for automatic recovery of advertising service data from system failures.       |
| S-IOS-00170 | The ADSRV CI shall support a data administration utility for data import.   |
| S-IOS-00180 | The ADSRV CI shall support a data administration utility for data export.   |
| S-IOS-00220 | The ADSRV CI shall maintain a log of all information read, write, update and delete activity.                                       |

#### **4.2.1.4 Security Support**

These requirements cover the collection and usage of authorization information as it applies to the ADSRV CI.

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| S-IOS-00380 | The ADSRV CI shall collect the management data used to support security management. |
|-------------|---|



S-IOS-00390	Advertising data accesses shall be subject to access controls of read, write, update and delete, singly or in combination, based on data types.
S-IOS-00400	Advertising data accesses shall be subject to access controls of read, write, update and delete, singly or in combination, based on data ownership.
S-IOS-00410	The capability to add, delete, or modify individual advertising data and service listings shall be limited to authorized users.

#### **4.2.1.5 Operations Support**

The following requirements apply to operations support and the interaction of the ADSRV CI with the SMC.

S-IOS-00430	The ADSRV CI shall provide integration, testing, and simulation status to the SMC.
S-IOS-00440	The ADSRV CI shall provide maintenance status to the SMC.
S-IOS-00450	The ADSRV CI shall provide logistics status to the SMC.
S-IOS-00460	The ADSRV CI shall provide training information to the SMC.
S-IOS-00470	The ADSRV CI shall support the interruption of database administration and maintenance activities and their restart without loss of information.
S-IOS-00490	The ADSRV CI shall collect Fault Management Data and provide it to the MSS.
S-IOS-00500	The ADSRV CI shall collect Configuration Management Data and provide it to the MSS.
S-IOS-00510	The ADSRV CI shall collect Accountability Management Data and provide it to the MSS.
S-IOS-00520	The ADSRV CI shall provide the capability to receive from the SMC, maintenance directives.
S-IOS-00530	The ADSRV CI shall provide the capability to receive from the SMC, directives for integration, testing, and simulation.
S-IOS-00540	The ADSRV CI shall provide the capability to receive from the SMC, configuration management directives.
S-IOS-00550	The ADSRV CI shall provide the capability to receive from the SMC, logistics management directives.
S-IOS-00560	The ADSRV CI shall provide the capability to receive from the SMC fault management directives.
S-IOS-00570	The ADSRV CI shall provide the capability to receive from the SMC security directives.

S-IOS-00580            The ADSRV CI shall provide the capability to receive from the SMC training management directives.

#### **4.2.1.6 Connectivity Support**

These requirements cover ADSRV interfaces with other portions of the system.

S-IOS-00690            The ADSRV CI shall accept Search Requests as specified in Appendix A.

S-IOS-00700            The ADSRV CI shall accept Advertisement Requests as specified in Appendix A.

S-IOS-00710            The ADSRV CI shall accept Subscription Requests as defined in Appendix A.

S-IOS-00720            The ADSRV CI shall accept Advertisements as defined in Appendix A.

S-IOS-00760            The ADSRV CI shall provide Notifications in response to Subscription Events.

S-IOS-00770            The ADSRV CI shall be able to provide attributes of the Advertisements selected by a Search Request or an Advertisement Request as text document(s), hyperlink document(s) or a set of data records, in accordance with specifications contained in the request.

#### **4.2.1.7 Performance**

S-IOS-00340            The ADSRV CI shall perform a single keyword attribute directory search in not exceeding TBD seconds.

S-IOS-00350            The ADSRV CI shall perform an attributes search with a time range check of not exceeding TBD seconds.

S-IOS-00360            The ADSRV CI shall perform a multiple keyword attributes directory search with a spatial range check of not exceeding TBD seconds.

#### **4.2.1.8 Application Program Interface**

S-IOS-00800            The ADSRV CI shall provide an application program interface for the submission of Service Requests.

S-IOS-00810            The ADSRV CI shall provide an application program interface for the submission of requests for administrative services.

### **4.2.2 ADSHW - Advertising Server HWCI**

#### **4.2.2.1 Physical Requirements**

This section contains the physical requirements for the ADSHW HWCI for each release and DAAC site. These requirements are related to power, air conditioning, grounding, fire alarm,

acoustical, physical interface, and footprint sizes. The ECS Facilities Plan (DID 302/DV1) and Individual Facility requirements (DID 303/DV1) are reference documents related to this area.

S-IOS-60010	The electrical power requirements for ADSHW CI equipment shall be in accordance with Individual Facility Requirements (DID 303/DV1) and the ECS Facilities Plan (DID 302/DV1).
S-IOS-60020	The air conditioning requirements for the ADSHW CI equipment shall be in accordance with Individual Facility Requirements (DID 303/DV1) and the ECS Facilities Plan (DID 302/DV1).
S-IOS-60030	The grounding requirements for ADSHW CI equipment shall be in accordance with Individual Facility Requirements (DID 303/DV1).
S-IOS-60040	The fire alarm requirements for ADSHW CI equipment shall be in accordance with Individual Facility Requirements (DID 303/DV1).
S-IOS-60050	The acoustical requirements for ADSHW CI equipment shall be in accordance with Individual Facilities Requirements (DID 303/DV1).
S-IOS-60060	The physical interface requirements between ADSHW CI equipment and the facility shall be in accordance with "Individual Facilities Requirements (DID 303/DV1).
S-IOS-60070	The footprint size and the physical layout of ADSHW CI equipment shall be in accordance with the Individual Facilities Requirements (DID 303/DV10 and ECS Facilities Plan (DID 302/DV1).

#### **4.2.2.2 Operating System, Utilities, and Tools**

This section contains the operating system, utilities, and tools requirements for the Science Processing HWCI for each release and DAAC site.

S-IOS-60110	The operating system for each Unix platform in the ADSHW CI shall conform to the POSIX.2 standard.
S-IOS-60120	The ADSHW CI POSIX.2 compliant platform shall have the following utilities installed at a minimum: perl, emacs, gzip, tar, imake, prof, gprof, nm.
S-IOS-60130	The ADSHW CI POSIX.2 compliant platform shall have the following POSIX.2 user Portability Utilities installed at a minimum: man, vi.
S-IOS-60140	The ADSHW CI POSIX.2 compliant platform shall have the following POSIX.2 Software Development Utilities installed at a minimum: make.
S-IOS-60150	The ADSHW CI POSIX.2 compliant platform shall have the following POSIX.2 C-Language Development Utilities installed at a minimum: lex, yacc.

S-IOS-60160	The ADSHW CI POSIX.2 compliant platform shall have the following Unix shells installed at a minimum: C shell, Bourne shell, Korn shell.
S-IOS-60170	The ADSHW CI POSIX.2 compliant platform shall have on-line documentation or printed documentation for each installed tool.
S-IOS-60180	The ADSHW CI POSIX.2 compliant platform shall have installed one or more development environment supporting the following languages: <ul style="list-style-type: none"> <li>a. C,</li> <li>b. FORTRAN-77.</li> </ul>
S-IOS-60190	Each development environment associated with the POSIX.2 compliant platform in the ADSHW CI shall have the capability to compile and link strictly conformant POSIX-compliant source code.
S-IOS-60195	Each development environment associated with the POSIX.2 compliant platform in the ADSHW CI shall have an interactive source level debugger for ECS supported languages.

### 4.3 DMS - Data Management Subsystem

The subsystem provides three main functions:

- Provide a dispersed community of science users with services to search a set of data repositories (however, the repositories themselves and their search, access, and data management functions are not part of this subsystem).
- Allow those scientists to obtain explanations for the data offered by these repositories.
- Provide data search and access gateways between ECS and external information systems.

The Data Management subsystem decouples users and programs from the location of data, the methods used by a site to access the data, and the manner in which the data have been named. The subsystem consists of three services:

- A distributed search service called the Distributed Information Manager (DIM)
- A service which acts as the gateway between the data management services used by a site and the distributed search services; the service is called the Local Information Manager (LIM)
- A Data Dictionary Service which provides data names and explanations of the data and access operations in a distributed fashion.

Both the DIM and the LIM accept service requests (e.g., search requests and data requests) for execution, but they do not process them directly. Rather, the DIM and the LIM act as search agents on behalf of the users, by identifying the sources of data, and by transforming the original service requests into service requests which are acceptable to these sources. Users interface with their agent DIM or LIM to determine the status of a search or obtain the search results. The users

are decoupled from the actual sources, as well as from the methods which their DIM and LIM agents use to perform the searches and obtain optimal results.

Users formulate their service requests using user interface programs which are part of the Client subsystem. The user interfaces will interact with the Data Dictionary Service (often transparently to the user) to present the user with choices (e.g., of the data names applicable in a particular context) and interpret user input. Any intelligence available in the Data Dictionary about this data can be used by the user interfaces to formulate the search, e.g., to improve its accuracy. The Data Dictionary service is accessible to the components which process service requests (i.e., DIM and LIM) and the components which formulate service requests (i.e., user interface programs). As a result, a user interface can make references to data dictionary concepts which DIM and LIM can interpret. For example, a sciences user may enter search parameter names taken from a particular context (e.g., Atmospheric Dynamics). The user interface program will insert a reference to Atmospheric Dynamics into the search request. The DIM and the LIM can then interpret the parameter names in the proper context.

The SDPS Data Management architecture uses two levels of service request processing, the distribution level which is serviced by the DIM, and the site level, which is serviced by the LIM. A LIM provides an interface to a site. The inner workings of the site are hidden by its LIM, and each site can implement its own, specialized version of a LIM. DAACs and SCFs thus have the ability to decide how to best organize their data internally. On the other hand, the network needs only one type of DIM implementation, regardless of the number of LIMs. As a result, DAACs and SCFs need not be concerned about tailoring a DIM design to their requirements and implementing and maintaining DIM software.

Distributed search processing poses a number of difficult issues which SDPS plans to address in an evolutionary manner. SDPS will provide DIM and LIM implementations for ECS. Over time, the DIM design will be changed, e.g., to provide better optimization of distributed searches or enhanced capabilities for merging search results. Other organizations may develop their own LIM services.

The Data Management subsystem is being developed on the incremental track; therefore, the Level 4 requirements for this subsystem are draft requirements. Final as-built requirements will be available after the increments are complete.

#### **4.3.1 LIMGR - Local Information Manager CSCI**

The Local Information Manager CSCI provide the capabilities required to implement Local Information Managers (LIM) in ECS. Each LIM provides locally optimized access to logically related Data Servers. LIM services can be requested by a Distributed Information manager (DIM) or by a client directly. The LIM also provides the services needed by site administrators to integrate the Schemata of the related Data Servers into an integrated view of the data and services in the collection.

After the LIM accepts a site query or search request it acts as an agent of its requester and assumes responsibility for the execution and compilation of the results. If a request is submitted by a DIM,

the LIM provides status and results back to the DIM; if submitted directly by a client, the LIM also assumes responsibility for the management of the client session.

There may be more than one LIM at a site, each of which can support different data access and query languages, different protocols, or alternative integrated Schemata. Different LIMs may provide access to the same Data Servers, providing alternative views of the available site services. The LIM manages the integrating and formatting of partial results within a site and will supply these results to other services for integration in an overall search plan.

#### **4.3.1.1 Local Search**

The following requirements concern the administration of local searches. This includes scope of search, connections, creation of local search plans, and recovery from failure.

S-DMS-00010	The LIMGR CI shall provide capabilities to search and obtain data by science discipline.
S-DMS-00020	The LIMGR CI shall accept Search Requests in the format defined in Appendix A.
S-DMS-00040	The LIMGR CI shall determine which Data Servers are required in order to perform a Search Request and build a Site Query Plan as a result.
S-DMS-00050	The LIMGR CI shall initiate local data access and manipulation operations.
S-DMS-00060	The LIMGR CI shall provide the capability to receive Open Requests and establish a client session as the context for a series of Service Requests, as a result.
S-DMS-00070	The LIMGR CI shall provide the capability to receive Suspend Requests and suspend an ongoing client session, as a result.
S-DMS-00080	The LIMGR CI shall provide the capability to receive Resume Requests and resume a suspended client session, as a result.
S-DMS-00090	The LIMGR CI shall provide the capability to receive Close Requests and terminate an established client session, as a result.
S-DMS-00100	The LIMGR CI shall accept instruction from a Data Server, and provide capability, to integrate Search Results from a previous Search Request .
S-DMS-00110	The LIMGR CI shall accept Service Requests, and provide capability, to save the result of a Service Request for later reuse.
S-DMS-00120	The LIMGR CI shall provide the current Result Set (complete or incomplete) to the client or specified destination.
S-DMS-00130	The LIMGR CI shall accept Service Requests, and provide capability, to terminate processing of an active Service Request.

S-DMS-00140	The LIMGR CI shall accept Service Requests, and provide capability, to temporarily discontinue processing of an active Service Request.
S-DMS-00150	The LIMGR CI shall accept Service Requests, and provide capability, to restart a previously suspended Service Request.
S-DMS-00160	The LIMGR CI shall accept Service Requests, and provide capability, to provide an estimate of resources required to execute a pending Service Request.
S-DMS-00180	The LIMGR CI shall support interactive information management capabilities for administrators to retrieve information.
S-DMS-00190	The LIMGR CI shall use the identification of the user on whose behalf a Service Request is issued as the basis for access control decisions.
S-DMS-00200	The LIM shall use forward the identification of the user on whose behalf a Service Request is issued to Data Servers for Service Requests issued on the behalf of the user.
S-DMS-00240	In the case of processing failures, upon restart the LIM must complete all incomplete transactions without loss of data.
S-DMS-00250	The LIMGR CI shall maintain query_log_files.
S-DMS-00260	The LIMGR CI shall provide a capability to report status of user-initiated Service Requests submitted to it.
S-DMS-00460	The LIMGR CI shall provide Service Request Status in response to Status Requests.
S-DMS-00550	The LIMGR CI shall provide a capability to decompose the Search Requests it receives into executable data base Queries.
S-DMS-00560	The LIMGR CI shall provide the capability to abort any time-intensive operations.
S-DMS-00740	The LIM shall be able to respond to a Status Request for a specified Search Request by providing Search Results accumulated to this point, or Search Results accumulated since the last Status Request for that Search Request.

#### **4.3.1.2 LIM Schema**

The following requirements concern the administration of LIM database structures. These requirements cover the creation and use of integrated Schema at the LIM.

S-DMS-00030	The LIMGR CI shall create a union of Schemata from Data Servers into an integrated Schema.
S-DMS-00210	The LIM internal data base management shall be expressed in a <TBD> standard query language

S-DMS-00220	The LIMGR CI shall store, maintain and provide data management services for ECS local Schema.
S-DMS-00230	The LIMGR CI shall provide the capability to integrate partial results within those Data Servers represented in its local Schema.
S-DMS-00270	The LIMGR CI shall support revisions of its local Schema following Schema changes in the Data Servers represented in the LIMs local Schema.
S-DMS-00280	The LIMGR CI shall provide a data administration utility for adding, deleting, modifying, and expanding individual Schema.
S-DMS-00290	The LIMGR CI shall accept Service Requests, and provide capability, to find and retrieve a Schema entry from an integrated Schema.
S-DMS-00300	The LIMs shall provide the capability to search for Data Granules of EOSDIS data stored for all Data Servers represented in their local Schema.
S-DMS-00470	The LIMGR CI shall support the interruption of a any database administrative or maintenance activity and its restart without loss of information.

#### **4.3.1.3 Security and Management**

These requirements cover the collection and usage of authorization information as it applies to the LIMGR as well as the collection of management data.

S-DMS-00530	The LIMGR CI shall collect the management data used to support security management.
S-DMS-00540	The LIM data accesses shall be subject to read access controls based on data types, user privileges and data ownership.
S-DMS-00690	The LIMGR CI shall collect the management data used to support configuration management.
S-DMS-00700	The LIMGR CI shall collect Accounting Management Data used to support accounting.
S-DMS-00705	The LIMGR CI shall support operations staff in the creation of utilization reports, and the operations staff shall distribute them on a periodic basis to a predefined list of report recipients.
S-DMS-00706	The LIMGR CI shall provide operations staff the capability to distribute utilization reports electronically, in hard copy, or on electronic media.
S-DMS-00710	The LIMGR CI shall collect Accountability Management Data and provide it to the MSS.
S-DMS-00720	The LIMGR CI shall collect Performance Management Data and provide it to the MSS.



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| S-DMS-00730 | The LIMGR CI shall collect Scheduling Management Data and provide it to the MSS.   |
| S-DMS-00750 | The LIMGR CI shall have the capability of creating, editing and deleting advertisements about itself and submitting them to the Advertising Service. |

#### **4.3.1.4 Performance**

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| S-DMS-00480 | The LIMGR CI shall accept, process, and distribute to Data Servers a single instrument Inventory search consisting of multiple keyword attributes with spacial range check in not exceeding TBD seconds.  |
| S-DMS-00490 | The LIMGR CI shall accept, process, and distribute to Data Servers a multiple instrument Inventory search consisting of multiple keyword attributes with time range check in not exceeding TBD seconds.   |
| S-DMS-00500 | The LIMGR CI shall accept from Data Servers a single instrument Inventory Result Set consisting of multiple keyword attributes with spacial range check , integrate the results, and provide a complete Result Set in not exceeding TBD seconds.      |
| S-DMS-00510 | The LIMGR CI shall accept from Data Servers a multiple instrument Inventory search Result Set consisting of multiple keyword attributes with time range check, integrate the results, and provide a complete Result Set in not exceeding TBD seconds. |

#### **4.3.1.5 Operations Support**

These requirements cover the exchange of management in information with the SMC.

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| S-DMS-00570 | The LIMGR CI shall provide integration, testing, and simulation status to the SMC.                                     |
| S-DMS-00580 | The LIM shall provide maintenance status to the SMC.   |
| S-DMS-00590 | The LIM shall provide logistics status to the SMC.   |
| S-DMS-00600 | The LIM shall provide training information to the SMC.   |
| S-DMS-00610 | The LIMGR CI shall provide the capability to receive maintenance directives from the SMC.                              |
| S-DMS-00620 | The LIMGR CI shall provide the capability to receive directives for integration, testing, and simulation from the SMC. |
| S-DMS-00630 | The LIMGR CI shall provide the capability to receive configuration management directives from the SMC.                 |
| S-DMS-00640 | The LIMGR CI shall provide the capability to receive logistics management directives from the SMC.                     |

S-DMS-00650	The LIMGR CI shall provide the capability to receive fault management directives from the SMC.
S-DMS-00660	The LIMGR CI shall provide the capability to receive security directives from the SMC.
S-DMS-00670	The LIMGR CI shall provide the capability to receive training management directives from the SMC.

#### **4.3.1.6 Mediation Services**

The following requirements apply to mediation services which are used in monitoring Service Requests and in acquiring appropriate directions from the user at key decision points.

S-DMS-00800	The LIMGR CI shall be able to notify clients of events associated with Service Requests or sessions which require additional instructions from the client, e.g., when requests exceed a client specified threshold.
S-DMS-00810	The LIMGR CI shall provide the client with the capability to respond to notifications of events which require instructions from the client.
S-DMS-00820	The LIMGR CI shall provide the client the capability to specify the entry point to be used for this asynchronous notification in asynchronous Service Requests.
S-DMS-00830	The LIMGR CI shall provide the capability for clients to indicate that they do not wish to receive asynchronous notifications and provide default instructions for such notification events.
S-DMS-00840	The LIMGR CI shall be able to accept notifications of events associated with Service Requests it issued to other services or sessions it has with other services and translate them into the appropriate LIMGR events.

#### **4.3.1.7 Application Program Interface**

S-DMS-00900	The LIMGR CI shall provide an application program interface for the submission of Service Requests.
S-DMS-00910	The LIMGR CI shall provide an application program interface for the submission of requests for administrative services.

### **4.3.2 DIMGR - Distributed Information Manager CSCI**

The Distributed Information Manager CSCI provide the capabilities required to implement Distributed Information Managers (DIM) in ECS. The DIM receives and coordinates requests for data and services from several loosely coupled provider sites. It provides clients with access to the following service objects: distributed query request, distributed access request, request result, client session, distributed Schema, and Local Information Manager (LIM) federation.

The DIM will accept requests to initiate, suspend, resume and terminate client sessions; manage distributed queries or access requests; inquire about the status of these requests; produce both complete and incomplete results; and update its internal Schema.

The DIM uses a Schema which is federated from Schemata at the underlying service providers (e.g., LIMs). After the DIM accepts a request from a client, it acts as an agent for that client and assumes complete responsibility for execution of the query and compilation of the results.

A DIM does not execute requests on its own, but it determines how they should be executed. This is called a distributed query plan. The plan specifies the services which the DIM must invoke, including any operations which the DIM may need to perform to combine or collate the results. The DIM will execute the plan, monitor its progress, and compile and manage the results for the requesting client. The actions of the CSCI are completely asynchronous - the client can disconnect from the DIM and reconnect later to determine the status of a query, obtain partial results, or cancel the query.

#### **4.3.2.1 Distributed Search**

The following requirements concern the administration of multi-site searches. These cover distributed searches, the creation and monitoring of distributed search plans, connectivity, and recovery from failure.

S-DMS-10010	The DIMGR CI shall provide capabilities to search and obtain data across DAACs
S-DMS-10020	The DIMGR CI shall accept and execute Search Requests which require searching across DAACs.
S-DMS-10030	The DIMGR CI shall compare received Search Requests to its federated Schema to determine to which LIMs or Data Servers the Search Request must be forwarded and generate a Distributed Query Plan.
S-DMS-10040	Upon determining which LIMs are required to complete a Search Request, the DIM shall send to the requisite LIMs the portions of the original Search Request which apply to them.
S-DMS-10050	The DIMGR CI shall monitor the progress of the Distributed Query Plan.
S-DMS-10060	The DIMGR CI shall compile and manage the results of the Distributed Query Plan for the client which initiated it.
S-DMS-10070	The DIMGR CI shall execute, monitor, and compile plan results without continuous connection with the client. This capability shall allow the client to disconnect from and later reconnect to the DIM to retrieve the results.
S-DMS-10090	The DIMGR CI shall store, maintain and provide data management services for ECS federated Schema.
S-DMS-10100	The DIMGR CI shall provide the capability to abort any time-intensive operations.

S-DMS-10110	The DIMGR CI shall provide the capability to integrate partial results from those LIMs represented in its federated Schema into a complete Result Set.
S-DMS-10120	In the case of processing failures, upon restart the DIM must complete all incomplete transactions without loss of data.
S-DMS-10130	The DIMGR CI shall maintain query_log_files.
S-DMS-10140	The DIMGR CI shall provide a capability to report status of Search Requests submitted to it.
S-DMS-10310	The DIMs shall provide the capability to search for Data Granules of EOSDIS data stored across DAACs for specific science disciplines.
S-DMS-10320	The DIMGR CI shall provide Service Request Status in response to Status Requests.
S-DMS-10330	The DIMGR CI shall use the User Identifier for the user on whose behalf a Service Request is issued as the basis for access control decisions.
S-DMS-10340	The DIMGR CI shall forward the user's User Identifier in any Service Requests that it sends to the LIMGR CI on behalf of that user..
S-DMS-10650	The DIMGR CI shall initiate distributed data access and manipulation operations.
S-DMS-10660	The DIMGR CI shall provide the capability establish a client session as the context for a series of Service Requests.
S-DMS-10670	The DIMGR CI shall provide the capability to suspend an ongoing client session.
S-DMS-10680	The DIMGR CI shall provide the capability to re-connect to a session.
S-DMS-10690	The DIMGR CI shall provide the capability to terminate an established client session.
S-DMS-10700	The DIMGR CI shall provide the capability to save the result of a Service Request for later reuse.
S-DMS-10710	The DIMGR CI shall provide the current Result Set (complete or incomplete) to the client or specified destination.
S-DMS-10720	The DIMGR CI shall provide the capability, to terminate processing of an active Service Request.
S-DMS-10730	The DIMGR CI shall provide the capability, to temporarily discontinue processing of an active Service Request.
S-DMS-10740	The DIMGR CI shall provide the capability, to restart a previously suspended Service Request.

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| S-DMS-10750 | The DIMGR CI shall provide the capability, to provide an estimate of resources required to execute a pending Service Request.  |
| S-DMS-10760 | The DIMGR CI shall be able to respond to a Status Request for a specified Search Request by providing Search Results accumulated to that point, or Search Results accumulated since the last Status Request. |

#### **4.3.2.2 DIM Schema**

The following requirements concern the administration of DIM database structures. These requirements cover the creation, maintenance and usage of the federated Schema at the DIM.

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| S-DMS-10150 | The DIMGR CI shall support revisions of its federated Schema following Schema changes in the LIMs represented in the DIM's federated Schema.                               |
| S-DMS-10160 | The DIMGR CI shall be able to receive the local Schema of LIMs in its federation from the LIM service.   |
| S-DMS-10170 | The DIMGR CI shall create a union of the Schemata it receives from LIMs in its federation. This union is a federated Schema.   |
| S-DMS-10180 | The DIMGR CI shall not alter the Schemata it receives from any LIM in creating the federated Schema.   |
| S-DMS-10190 | The DIMGR CI shall subscribe to the LIMs for any changes in LIM Schemata.  |
| S-DMS-10200 | The DIMGR CI shall subscribe to the Advertising service for any additions or deletions of LIMs from its federation.  |
| S-DMS-10210 | The DIMGR CI shall be able to add a LIM to its federation based on the subscription notifications it receives from the Advertising service.                                |
| S-DMS-10220 | The DIMGR CI shall provide an interface whereby a LIM may be deleted from the federation based on the subscription notifications it receives from the Advertising service. |
| S-DMS-10240 | The DIMGR CI shall provide a data administration utility for adding, deleting, modifying, and expanding an individual Schema.  |
| S-DMS-10250 | The distributed Schema administrator shall maintain the federated Schema in the DIM.   |
| S-DMS-10260 | The DIMGR CI shall provide an interface to the DIM administrator client whereby a LIM may be added to the federation.  |
| S-DMS-10270 | The DIMGR CI shall provide an interface to the DIM administrator client whereby a LIM may be deleted from the federation.  |
| S-DMS-10280 | The DIMGR CI shall provide an interface to the DIM administrator client whereby a LIM may be replaced in the federation.   |

S-DMS-10290	The DIMGR CI shall provide an interface to the DIM administrator client whereby LIM information may be retrieved from the federation.
S-DMS-10300	The DIMGR CI shall provide the capability to find and retrieve a Schema entry from an distributed Schema.
S-DMS-10600	The DIM data accesses shall be subject to read access control based on user privileges.
S-DMS-10610	The DIM internal data base management Queries shall be expressed in a <TBD> query language
S-DMS-10460	The DIMGR CI shall support the interruption of a database administrative or maintenance activity and its restart without loss of information.

#### **4.3.2.3 Operations Support**

These requirements cover the exchange of management information with the SMC.

S-DMS-10350	The DIMGR CI shall provide integration, testing, and simulation status to the SMC.
S-DMS-10360	The DIM shall provide maintenance status to the SMC.
S-DMS-10370	The DIM shall provide logistics status to the SMC.
S-DMS-10380	The DIM shall provide training information to the SMC.
S-DMS-10390	The DIMGR CI shall provide the capability to receive maintenance directives from the SMC.
S-DMS-10400	The DIMGR CI shall provide the capability to receive, directives for integration, testing, and simulation from the SMC.
S-DMS-10410	The DIMGR CI shall provide the capability to receive, configuration management directives from the SMC.
S-DMS-10420	The DIMGR CI shall provide the capability to receive logistics management directives from the SMC.
S-DMS-10430	The DIMGR CI shall provide the capability to receive fault management directives from the SMC.
S-DMS-10440	The DIMGR CI shall provide the capability to receive security directives from the SMC.
S-DMS-10450	The DIMGR CI shall provide the capability to receive training management directives from the SMC.

#### **4.3.2.4 Performance**

S-DMS-10470	The DIMGR CI shall accept, process, and distribute to LIMs a multiple DAAC, single instrument Inventory search consisting of multiple keyword attributes with spacial range check of not exceeding TBD seconds.
S-DMS-10480	The DIMGR CI shall accept, process, and distribute to LIMs a multiple DAAC, multiple instrument Inventory search consisting of multiple keyword attributes with time range check of not exceeding TBD seconds.
S-DMS-10490	The DIMGR CI shall accept from LIMs a multiple DAAC, single instrument Inventory Result Set consisting of multiple keyword attributes with spacial range check, integrate the results, and provide a complete Result Set in not exceeding TBD seconds.
S-DMS-10500	The DIMGR CI shall accept from LIMs multiple DAAC, multiple instrument Inventory search consisting of multiple keyword attributes with time range check , integrate the results, and provide a complete Result Set in not exceeding TBD seconds.

#### **4.3.2.5 DIM Management**

These requirements cover the collection of management data at the DIM in support of various aspects of system administration.

S-DMS-10530	The DIMGR CI shall collect the management data used to support fault recovery management.
S-DMS-10540	The DIMGR CI shall collect the management data used to support configuration management.
S-DMS-10550	The DIMGR CI shall collect Accounting Management Data used to support accounting management.
S-DMS-10555	The DIMGR CI shall support operations staff in the creation of utilization reports, and the operations staff shall distribute them on a periodic basis to a predefined list of report recipients.
S-DMS-10556	The DIMGR CI shall provide operations staff with the capability to distribute DIMGR CI utilization reports electronically or in hard copy or on electronic media.
S-DMS-10560	The DIMGR CI shall collect Accountability Management Data and provide it to the MSS.
S-DMS-10570	The DIMGR CI shall collect Performance Management Data and provide it to the MSS.
S-DMS-10580	The DIMGR CI shall collect Security Management Data and provide it to the MSS.

S-DMS-10590      The DIMGR CI shall collect Scheduling Management Data and provide it to the MSS. The management data is used to support scheduling management.

#### **4.3.2.6 Mediation Services**

The following requirements apply to mediation services which are used in monitoring Service Requests and in acquiring appropriate directions from the user at key decision points.

S-DMS-10800      The DIMGR CI shall be able to notify clients of events associated with Service Requests or sessions which require additional instructions from the client, e.g., when requests exceed a client specified threshold.

S-DMS-10810      The DIMGR CI shall provide the client with the capability to respond to notifications of events which require instructions from the client.

S-DMS-10820      The DIMGR CI shall provide the client the capability to specify the entry point to be used for this asynchronous notification in asynchronous Service Requests.

S-DMS-10830      The DIMGR CI shall provide the capability for clients to indicate that they do not wish to receive asynchronous notifications and provide default instructions for such notification events.

S-DMS-10840      The DIMGR CI shall be able to accept notifications of events associated with Service Requests it issued to other services or sessions it has with other services and translate them into the appropriate LIMGR events.

#### **4.3.2.7 Application Program Interface**

S-DMS-10900      The DIMGR CI shall provide an application program interface for the submission of Service Requests.

S-DMS-10910      The DIMGR CI shall provide an application program interface for the submission of requests for administrative services.

### **4.3.3 DDICT- Data Dictionary CSCI**

The Data Dictionary CSCI manages and provides access to databases containing information about data. Each data object, data element, data relationship and access operation available through Data Servers, Local Information Managers (LIMs) and Distributed Information Managers (DIMs) are defined and described in the dictionary databases.

A user may access the Data Dictionary to get a list of Data Products defined in the dictionary together with their scientific definitions. A query program accesses the Data Dictionary service to present a user with a list of attributes available and full explanation of each attribute.



The Data Dictionary will provide three methods for organizing and presenting Data Dictionary information.

1. Data Dictionary Views restrict the access to a specific subset of the Data Dictionary information. User interface programs will typically use this type of access in a manner which is transparent to the user in order to make navigation through the Data Dictionary easier.
2. Data Dictionary Domains are hierarchies of Schema and Data Dictionary information which are analogous to the hierarchy of search and access services provided by the DIM and LIM. Each level of the Data Management subsystem is supported by Data Dictionary and Schema information consistent with the area of responsibility and degree of integration represented by that particular level.
3. Data Dictionary Contexts restrict the visibility of Data Dictionary information to a particular context. For example, "Atmospheric Dynamics" could be defined as a Data Dictionary context and then referenced by user interface programs. As a result, when the user references a name or browse in the Data Dictionary, only those names defined in the context of Atmospheric Dynamics would be visible.

Data administrators can define objects, attributes and operations in the Data Dictionary during the planning and design stages for Data Servers, LIMs and DIMs. The tools which are used to create data Schemata for a Data Server and LIM will also verify that all elements in the scheme (object types, attributes, operations) have been defined and will prompt the administrators for additions or corrections if they are not. They will then update the Data Dictionary automatically from these inputs, converting Schema information into a Data Dictionary input in the process.

#### **4.3.3.1 Data Dictionary Items**

The following requirements concern the holdings of the Data Dictionary Service. This includes contents of the DDICT, interface support, and management of DDICT entries.

S-DMS-20005	The DDICT CI shall provide access to Data Definitions.
S-DMS-20010	The DDICT CI shall maintain data_dictionary_entries consisting of the following information at a minimum: Earth_Science_Data_Types and services descriptions, Core_Metadata attribute definitions, Valid Values, and synonyms, Product Specific Metadata.
S-DMS-20070	The DDICT CI shall support variations within data_dictionary_entries
S-DMS-20100	The DDICT CI shall support variations in data_dictionary_entries based on the data_dictionary_context
S-DMS-20120	The DDICT CI shall maintain information describing the relationships between Earth_Science_Data_Types.
S-DMS-20150	The DDICT CI shall have the capability to accept from the Advertising Service CI, Export_Files, for the purposes of defining new or updated data_dictionary_entries

S-DMS-20160	The DDICT CI shall have the capability to accept from the SDSRV CIData Server, Export_Files, for the purposes of defining new or updated data_dictionary_entries
S-DMS-20170	The DDICT CI shall have the capability to accept from the LIM CI, Export_Files, for the purposes of defining new or updated data_dictionary_entries
S-DMS-20180	The DDICT CI shall have the capability to accept from the DIM CI, Export_Files, for the purposes of defining new or updated data_dictionary_entries
S-DMS-20190	The DDICT CI shall maintain consistency between its data_dictionary_entries and Schema information from which they were derived.
S-DMS-20200	The DDICT CI shall support additions, deletions and modifications to DDICT CI Schema.
S-DMS-20250	The DDICT CI shall store, maintain and provide data management services for ECS data_dictionary_entries.
S-DMS-20530	The DDICT CI shall support batch information management capabilities to add data_dictionary_entries.
S-DMS-20540	The DDICT CI shall support batch information management capabilities to update data_dictionary_entries.
S-DMS-20550	The DDICT CI shall support batch information management capabilities to delete data_dictionary_entries.
S-DMS-20560	The DDICT CI shall support batch information management capabilities to retrieve data_dictionary_entries.
S-DMS-20570	The DDICT CI shall support interactive information management capabilities to add data_dictionary_entries.
S-DMS-20580	The DDICT CI shall support interactive information management capabilities to update data_dictionary_entries.
S-DMS-20590	The DDICT CI shall support interactive information management capabilities to delete data_dictionary_entries.
S-DMS-20600	The DDICT CI shall support interactive information management capabilities to retrieve data_dictionary_entries.
S-DMS-20610	The DDICT CI shall maintain a log of all update activity to data_dictionary_entries.
S-DMS-20620	Standard Product related Metadata at the DDICT CI shall include keywords and glossary from investigators.

S-DMS-20630	Standard Product related Metadata at the DDICT CI shall include of keywords, synonyms, and glossary for cross-product and cross-directory referencing.
S-DMS-20640	The DDICT CI support the unintended interruption of database administration and maintenance activities and their restart without loss of information.
S-DMS-20660	The DDICT CI shall collect the management data used to support security management.
S-DMS-20670	The DDICT CI shall establish access controls of read, write, update and delete, singly or in combination, based on data types.
S-DMS-20680	The DDICT CI shall establish access controls of read, write, update and delete, singly or in combination, based on data ownership.
S-DMS-20690	The DDICT CI shall provide the capability to add, delete, or modify ECS to authorized users.
S-DMS-20800	The DDICT CI shall suspend and restart database administration and maintenance activities without loss of information.
S-DMS-20820	The DDICT CI shall collect Fault Management Data and provide it to the MSS.
S-DMS-20830	The DDICT CI shall collect Configuration Management Data and provide it to the MSS.
S-DMS-20840	The DDICT CI shall collect Accountability Management Data and provide it to the MSS.
S-DMS-20850	The DDICT CI shall collect Performance Management Data and provide it to the MSS.
S-DMS-20860	The DDICT CI shall collect Scheduling Management Data and provide it to the MSS.
S-DMS-20890	The DDICT CI shall provide access to the lists of the Valid Values for data elements, where the data element has an enumerated set of values as a constraint.
S-DMS-20900	The DDICT CI shall validate DAR parameters against constraints provided by EOC and External Instrument Operations Facilities (e.g., Landsat-7).
S-DMS-20910	The DDICT CI shall provide access to the lists of the Valid Values for data elements, where the data element has an enumerated set of values as a constraint

S-DMS-20920      The DDICT CI shall provide the capability to relate Phenomenological Search Criteria to Search Criteria containing values for searchable attributes supported in the Data Server Schema.

#### **4.3.3.2 Data Dictionary Views**

The following requirements concern context-limiting ways to view Data Dictionary Service holdings. This includes the specification of contexts, access control, and view definition.

S-DMS-20020      The DDICT CI shall provide the capability to view data\_dictionary\_entries based on the Earth\_Science\_Data\_Types accessible by an instance of the advertising service.

S-DMS-20030      The DDICT CI shall provide the capability to view data\_dictionary\_entries based on the Earth\_Science\_Data\_Types accessible by an instance of the Data Server.

S-DMS-20040      The DDICT CI shall provide the capability to view data\_dictionary\_entries based on the Earth\_Science\_Data\_Types accessible by an instance of the LIM

S-DMS-20050      The DDICT CI shall provide the capability to view data\_dictionary\_entries based on the Earth\_Science\_Data\_Types accessible by an instance of the DIM.

S-DMS-20060      The DDICT CI shall provide the capability to define a global view of data\_dictionary\_entries based on the Earth\_Science\_Data\_Types accessible by the ECS

S-DMS-20080      The DDICT CI shall provide consistent view of data\_dictionary\_entries based on the value given for an attribute.

S-DMS-20090      The DDICT CI shall provide the capability to define data\_dictionary\_contexts based on science disciplines, site, and instrument.

S-DMS-20110      The DDICT CI shall provide the capability to define a global data\_dictionary\_context.

S-DMS-20130      The DDICT CI shall have the capability to accept from the Workbench CI, data\_dictionary\_information\_requests, consisting of any combination of the following: Earth\_Science\_Data\_Types, Core\_Metadata attribute, Product Specific Metadata.

S-DMS-20140      The DDICT CI shall have the capability to send to the Workbench CI, Earth\_Science\_Data\_Types descriptions, Core\_Metadata attribute definitions, domains, and synonyms, Product Specific Metadata attribute definitions, domains, and synonyms

S-DMS-20210      The DDICT CI shall use the identification of the user on whose behalf a Service Request is issued as the basis for access control decisions.

S-DMS-20220	The DDICT CI data accesses shall be subject to access controls of read, write, update and delete, singly or in combination, based on user privileges.
S-DMS-20240	The DDICT CI shall provide a capability to decompose the Search Requests it receives into executable data base Queries.
S-DMS-20870	The DDICT CI shall provide the capability to relate Phenomenological Search Criteria to Search Criteria containing values for searchable attributes supported in the Data Server Schema.
S-DMS-20880	The DDICT CI shall have the capability to receive from the Data Administrator, Data_Administration_Requests
S-DMS-23910	The Data Dictionary shall validate ASTER DAR parameters against constraints provided by the ASTER instrument operations facilities.

#### **4.3.3.3 Performance**

These requirements cover the data collection and administration utilities for performance monitoring and tuning.

S-DMS-20260	The DDICT CI shall support an administration utility for performance monitoring of system disk, memory, CPU and Input/Output.
S-DMS-20270	The DDICT CI shall support an administration utility for performance monitoring of Service Requests processing.
S-DMS-20280	The DDICT CI shall support an administration utility for performance tuning.
S-DMS-20290	The DDICT CI shall support an administration utility for administration of access control.
S-DMS-20300	The DDICT CI shall support an administration utility for on-line full backup of advertising service data.
S-DMS-20310	The DDICT CI shall support an administration utility for on-line incremental backup of advertising service data.
S-DMS-20320	The DDICT CI shall support an administration utility for manual recovery of Data Dictionary data from system and media failures.
S-DMS-20330	The DDICT CI shall support an administration utility for automatic recovery of DDICT CI data from system failures.
S-DMS-20340	The DDICT CI shall support a data administration utility for data import.
S-DMS-20350	The DDICT CI shall support a data administration utility for data export.

#### **4.3.3.4 Operations Support**

These requirements cover the exchange of management information with the SMC.

S-DMS-20700	The DDICT CI shall provide integration, testing, and simulation status to the SMC.
S-DMS-20710	The DDICT CI shall provide maintenance status to the SMC.
S-DMS-20720	The DDICT CI shall provide logistics status to the SMC.
S-DMS-20730	The DDICT CI shall provide training information to the SMC.
S-DMS-20735	The DDICT CI shall provide the capability to receive maintenance directives from the SMC.
S-DMS-20740	The DDICT CI shall provide the capability to receive directives for integration, testing, and simulation from the SMC.
S-DMS-20750	The DDICT CI shall provide the capability to receive configuration management directives from the SMC.
S-DMS-20760	The DDICT CI shall provide the capability to receive logistics management directives from the SMC.
S-DMS-20770	The DDICT CI shall provide the capability to receive fault management directives from the SMC.
S-DMS-20780	The DDICT CI shall provide the capability to receive security directives from the SMC.
S-DMS-20790	The DDICT CI shall provide the capability to receive training management directives from the SMC.

#### **4.3.3.5 Application Program Interface**

S-DMS-21000	The DDICT CI shall provide an application program interface for the submission of Service Requests.
S-DMS-21010	The DDICT CI shall provide an application program interface for the submission of requests for administrative services.

#### **4.3.4 GTWAY- Version 0 Interoperability CSCI**

The Version 0 Interoperability CSCI provides a bi-directional gateway between ECS and the Version 0 System. The CSCI enables V0 IMS users to query ECS databases, and enables users of the ECS Client Subsystem to query Version 0 databases.

S-DMS-30310	The GTWAY CI shall have the capability to send V0 Inventory Search Requests to the Version 0 IMS using Version 0 system protocols.
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S-DMS-30320	The GTWAY CI shall have the capability to receive and interpret V0 Inventory Search Results from the Version 0 IMS using Version 0 system protocols.
S-DMS-30340	The GTWAY CI shall have the capability to send V0 Browse Requests to the Version 0 IMS using Version 0 system protocols.
S-DMS-30350	The GTWAY CI shall have the capability to send V0 Product Requests to the Version 0 IMS using Version 0 system protocols.
S-DMS-30360	The GTWAY CI shall have the capability to receive and process V0 Inventory Search Requests from the Version 0 IMS using Version 0 system protocols.
S-DMS-30370	The GTWAY CI shall have the capability to send V0 Inventory Search Results to the Version 0 IMS using Version 0 system protocols.
S-DMS-30380	The GTWAY CI shall have the capability to receive and process V0 Browse Requests from the Version 0 IMS using Version 0 system protocols.
S-DMS-30390	The GTWAY CI shall have the capability to send V0 Browse Results to the Version 0 IMS using Version 0 system protocols.
S-DMS-30400	The GTWAY CI shall have the capability to receive and process V0 Product Requests from the Version 0 IMS using Version 0 system protocols.
S-DMS-30410	The GTWAY CI shall have the capability to receive V0 Migration Metadata from the Version 0 IMS using Version 0 system protocols.
S-DMS-30420	The GTWAY CI shall have the capability to receive V0 Migration Metadata from the Version 0 PGS using Version 0 system protocols.
S-DMS-30430	The GTWAY CI shall have the capability to exchange V0 Migration Coordination Messages with the DAAC(s).
S-DMS-30440	The GTWAY CI shall have the capability to receive V0 Advertising Information from the DAAC(s).
S-DMS-30450	The GTWAY CI shall have the capability to send Dependent Valid Values to the ESDIS IMS using V0 system protocols.
S-DMS-30500	The GTWAY CI shall provide an application program interface for the submission of Service Requests.
S-DMS-30510	The GTWAY CI shall provide an application program interface for the submission of requests for administrative services.

### **4.3.5 DMGHW- Data Management HWCI**

#### **4.3.5.1 Physical Requirements**

This section contains the physical requirements for the DMGHW HWCI for each release and DAAC site. These requirements are related to power, air conditioning, grounding, fire alarm, acoustical, physical interface, and footprint sizes. The ECS Facilities Plan (DID 302/DV1) and Individual Facility requirements (DID 303/DV1) are reference documents related to this area.

S-DMS-60010	The electrical power requirements for DMGHW CI equipment shall be in accordance with Individual Facility Requirements (DID 303/DV1) and the ECS Facilities Plan (DID 302/DV1).
S-DMS-60020	The air conditioning requirements for the DMGHW CI equipment shall be in accordance with Individual Facility Requirements (DID 303/DV1) and the ECS Facilities Plan (DID 302/DV1).
S-DMS-60030	The grounding requirements for DMGHW CI equipment shall be in accordance with Individual Facility Requirements (DID 303/DV1).
S-DMS-60040	The fire alarm requirements for DMGHW CI equipment shall be in accordance with Individual Facility Requirements (DID 303/DV1).
S-DMS-60050	The acoustical requirements for DMGHW CI equipment shall be in accordance with Individual Facilities Requirements (DID 303/DV1).
S-DMS-60060	The physical interface requirements between DMGHW CI equipment and the facility shall be in accordance with "Individual Facilities Requirements (DID 303/DV1).
S-DMS-60070	The footprint size and the physical layout of DMGHW CI equipment shall be in accordance with the Individual Facilities Requirements (DID 303/DV10 and ECS Facilities Plan (DID 302/DV1).

#### **4.3.5.2 Operating System, Utilities, and Tools**

This section contains the operating system, utilities, and tools requirements for the Science Processing HWCI for each release and DAAC site.

S-DMS-60110	The operating system for each Unix platform in the DMGHW CI shall conform to the POSIX.2 standard.
S-DMS-60120	The DMGHW CI POSIX.2 compliant platform shall have the following utilities installed at a minimum: perl, emacs, gzip, tar, imake, prof, gprof, nm.
S-DMS-60130	The DMGHW CI POSIX.2 compliant platform shall have the following POSIX.2 user Portability Utilities installed at a minimum: man, vi.



S-DMS-60140	The DMGHW CI POSIX.2 compliant platform shall have the following POSIX.2 Software Development Utilities installed at a minimum: make.
S-DMS-60150	The DMGHW CI POSIX.2 compliant platform shall have the following POSIX.2 C-Language Development Utilities installed at a minimum: lex, yacc.
S-DMS-60160	The DMGHW CI POSIX.2 compliant platform shall have the following Unix shells installed at a minimum: C shell, Bourne shell, Korn shell.
S-DMS-60170	The DMGHW CI POSIX.2 compliant platform shall have on-line documentation or printed documentation for each installed tool.
S-DMS-60180	The DMGHW CI POSIX.2 compliant platform shall have installed one or more development environment supporting the following languages: <ul style="list-style-type: none"> <li>a. C,</li> <li>b. FORTRAN-77.</li> </ul>
S-DMS-60190	Each development environment associated with the POSIX.2 compliant platform in the DMGHW CI shall have the capability to compile and link strictly conformant POSIX-compliant source code.
S-DMS-60195	Each development environment associated with the POSIX.2 compliant platform in the DMGHW CI shall have an interactive source level debugger for ECS supported languages.

#### 4.4 DSS - Data Server Subsystem

The Data Server subsystem provides the physical storage access and management functions for the ECS earth science data repositories. Other subsystems can access it directly or via the data management subsystem (if they need assistance with searches across several of these repositories). The subsystem also includes the capabilities needed to distribute bulk data via electronic file transfer or physical media. The main components of the subsystem are the following:

- Database management system—SDPS will use an off-the-shelf DBMS to manage its earth science data and implement spatial searching, as well as for the more traditional types of data (e.g., system administrative and operational data). It will use a document management system to provide storage and information retrieval for guide documents, scientific articles, and other types of document data.
- File storage management systems—they are used to provide archival and staging storage for large volumes of data. SDPS is considering the use of several hardware/software configurations which are either off-the-shelf or a mixture of off-the-shelf and developed software.

- data type libraries—they will implement functionality of earth science and related data that is unique and not available off the shelf (e.g., spatial search algorithms and translations among coordinate systems). The libraries will interface with the data storage facilities, i.e., the database and file storage management systems.

Other components include, for example, administrative software to manage the subsystem resources and perform data administration functions (e.g., to maintain the database Schema); and data distribution software, e.g., for media handling and format conversions.

#### **4.4.1 SDSRV- Science Data Server CSCI**

Each Data Server provides access to a collection of earth science and related data. The scope of data and services offered by a Data Server are defined as follows:

The Data Server makes its data collections and services known to the ECS community by providing Advertisements to the Advertising Service. The contents of Advertisements include the name of the data collection and the names of the Earth Science Data Type (ESDT) being offered, as well as descriptions of the services (e.g., search, browse, subsetting, subsampling, and other types of access services) being offered for the collection.

The Data Server provides a formal description of its ESDTs, including their attributes and operations, as a Data Server Schema. Data search and access operations are expressed in terms of this Schema. For example, searching for LIS03 data based on 'spatial coverage' and 'temporal coverage' is only possible if 'spatial coverage' and 'temporal coverage' have been defined in the Schema; the definition would specify, for example, what types of input parameters can be used in the search.

The Data Server provides a description of the meaning of each ESDT, each attribute, and each operation or service in the Data Server Data Dictionary. The data dictionary can be browsed and accessed by science users from the Scientist Workbench in the Client Subsystem. Moreover, the data dictionary is defined as an ESDT in the Data Server Schema, and thus is accessible through the normal data search and access interfaces provided by the Data Server.

The Data Server Schema is an object Schema. The Schema presents the data in terms of the ESDT and the operations available on each ESDT (the operations are called the "Data Type Services"). For example, to obtain spatial and temporal coverage of a LIS03 granule, a User would request 'spatial\_coverage, temporal\_coverage of LIS03' (other specifications in the request would deal with selecting the granules of interest). The Schema also presents any other services available on objects as operations. For example, to obtain a browse image of LIS03 granules, the client would request 'browse\_image of LIS03'; to obtain a subset, the client might request 'subset(subset\_criteria) of LIS03'; and to obtain the subset in a specific format, the client might request 'my\_format of subset(subset\_criteria) of LIS03'.

Science Data Servers provide data access capability, for science users and clients, that remove any arbitrary distinctions between stored data and computed data, and between data and metadata. Each Science Data Server provides consistent data query and access capabilities by treating metadata and data as logically equivalent entities and by providing transparent data access. By

treating data and services as logically equivalent entities, the Science Data Server CSCI provides consistent access to all data, whether it is stored, computed, or scheduled for future acquisition.

The Science Data Server CSCI collaborates with other CSCIs within the Data Server Subsystem as follows:

- *Storage Management Software CSCI*—to provide persistent storage for large objects on a hierarchy of storage devices.
- *Data Distribution CSCI*—to distribute collections of data instances (e.g., data granules) to the requester
- *Document Server CSCI*—to allow clients to access related document-type information of the Data Server's data objects

The Science Data Server CSCI also collaborates with the services of the Interoperability Subsystem to provide information on the data types managed by a given Data Server, and the associated Data Type services.

#### **4.4.1.1 Service Request Processing**

These requirements define the processing for the receipt and execution of service requests for Science Data Server.

S-DSS-00010	The SDSRV CI shall accept Data Requests for Data that is managed within the STMGT CI.
S-DSS-00015	The SDSRV CI shall insure that each Data Request includes a User Identifier, a Request Priority, and a Data Identifier.
S-DSS-00020	The SDSRV CI shall accept Service Requests from clients.
S-DSS-00023	The SDSRV CI shall perform services specified by Service Requests.
S-DSS-00025	The SDSRV CI shall insure that each Service Request includes a User Identifier, a Request Priority, and all other parameters required for that request.
S-DSS-00030	The SDSRV CI shall provide the capability to queue Service Requests prior to their execution.
S-DSS-00040	The SDSRV CI shall provide operations staff the capability to view queued Service Requests.
S-DSS-00050	The SDSRV CI shall process each Service Request on the basis of Priority Information specified in the Service Request.
S-DSS-00051	The SDSRV CI shall verify that each Service Request has valid Priority Information.
S-DSS-00055	The SDSRV CI shall initiate the processing of Service Requests of equal priority in the order in which they are received.

S-DSS-00060	The SDSRV CI shall acknowledge the receipt of Service Requests from local and remote clients.
S-DSS-00065	The SDSRV CI shall accept Service Requests from the Data Processing subsystem and, as a result, provide access to Data for the purpose of standard processing.
S-DSS-00070	The SDSRV CI shall accept Service Requests from the Data Processing subsystem and, as a result, provide access to Data for the purpose of reprocessing.
S-DSS-00080	The SDSRV CI shall process Data Insert Requests that request the storage of Data Products and associated Metadata.
S-DSS-00090	The SDSRV CI shall validate that each Data Insert Request contains a List of Data Files.
S-DSS-00095	The SDSRV CI shall return a Reject Notification if a Service Request fails validation.
S-DSS-00100	The SDSRV CI shall allow operations staff to set a threshold for the number of Service Requests to be queued for processing.
S-DSS-00110	The SDSRV CI shall provide operations staff the capability to determine the status of any or all existing Service Requests.
S-DSS-00115	The SDSRV CI shall accept Search Status Requests for a specified active Search Request and, if requested, provide all Search Results accumulated for that Search Request.
S-DSS-00116	The SDSRV CI shall accept Search Status Requests for a specified active Search Request and, if requested, provide all Search Results accumulated since the last Search Status Request for that Search Request.
S-DSS-00120	The SDSRV CI shall accept Status Requests from clients and, if requested, provide Service Request Status for any specified pending Service Requests, in return.
S-DSS-00130	The SDSRV CI shall accept Status Requests from clients and, if requested, provide Service Request Status for all pending Service Requests submitted by a specified user, in return.
S-DSS-00140	The SDSRV CI shall validate that a Status Request specifies either a valid pending Request Identifier or a valid User Identifier.
S-DSS-00150	The SDSRV CI shall accept and process Insert Metadata Requests to insert Metadata into the Inventory.
S-DSS-00160	The SDSRV CI shall accept and process Update Metadata Requests to update Metadata that has been previously stored in the Inventory.

S-DSS-00165	The SDSRV CI shall update the Inventory with the updated Metadata that was received.
S-DSS-00170	The SDSRV CI shall accept and process Search Requests to search the Inventory.
S-DSS-00180	The SDSRV CI shall accept and process Data Requests for Data Products that are produced on demand using the resources available to the Data Server.
S-DSS-00190	The SDSRV CI shall provide the capability for operations staff to delete a queued Data Request.
S-DSS-00191	The SDSRV CI shall notify the client whenever operations staff deletes a queued Data Request.
S-DSS-00200	The SDSRV CI shall provide the capability for a user to delete their own queued Data Request.
S-DSS-00210	The SDSRV CI shall provide operations staff the capability to update the Priority Information for a queued Service Request.
S-DSS-00215	The SDSRV CI shall provide operations staff the capability to modify any field in a queued Service request.
S-DSS-00216	The SDSRV CI shall provide the capability for operations staff to submit Service Requests under that user's User Identifier.
S-DSS-00220	The SDSRV CI shall provide operations staff the capability to cancel any Service Request.
S-DSS-00230	The SDSRV CI shall provide users the capability to cancel their own Service Requests.
S-DSS-00240	The SDSRV CI shall determine which Data Requests require post-retrieval processing.
S-DSS-00250	The SDSRV CI shall provide an application program interface for the submission of Service Requests.
S-DSS-00260	The SDSRV CI shall provide an application program interface for the submission of requests for administrative services.
S-DSS-00264	The SDSRV CI shall provide an application program interface which permits DAAC operations staff to link special subsetting capabilities into a Science Data Server.
S-DSS-00266	The SDSRV CI shall provide an interface which allows users to interactively insert into the data server a new search method developed by the user.

S-DSS-00268	The SDSRV CI shall provide an application program interface for linking search methods into a Data Server.
S-DSS-00270	The SDSRV CI shall accept and process Data Requests for Repaired Orbit Data.
S-DSS-00280	The SDSRV CI shall accept and process Data Requests for Attitude Data.
S-DSS-00310	The SDSRV CI shall provide the capability for authorized clients to submit Service Requests batch mode.
S-DSS-00320	The SDSRV CI shall notify clients that issue Cancellation Requests that the associated Service Request has been canceled or the associated Service Request was completed.

#### **4.4.1.2 Data Server Accounting Processing**

These requirements define the processing needed to accumulate and determine accounting information for the Science Data Server.

S-DSS-00330	The SDSRV CI shall record Request Identifiers to be used for accounting purposes.
S-DSS-00331	The SDSRV CI shall record the User Identifier of the science investigator associated with a Service Request, to be used for accounting purposes.
S-DSS-00332	The SDSRV CI shall record the amount of user storage associated with a science user, to be used for accounting purposes.
S-DSS-00333	The SDSRV CI shall record the amount of connect time associated with a science user, to be used for accounting purposes.
S-DSS-00340	The SDSRV CI shall record the level of CPU utilization for each Service Request to be used for accounting.
S-DSS-00350	The SDSRV CI shall record the level of I/O utilization for each Service Request to be used for accounting.
S-DSS-00360	The SDSRV CI shall record, for accounting purposes, a fixed personnel cost for Service Requests requiring interaction with operations staff.
S-DSS-00370	The SDSRV CI shall record a archival storage cost based on the number of bytes stored, to be used for accounting.
S-DSS-00375	The SDSRV CI shall associate User Accounting Information with client sessions.
S-DSS-00376	The SDSRV CI shall provide User Accounting Information to the SMC.
S-DSS-00377	The SDSRV CI shall support operations staff in the creation of utilization reports, and operations staff shall distribute them on a periodic basis to a predefined list of report recipients.

S-DSS-00378	Operations staff shall be able to distribute SDSRV utilization reports electronically or in hard copy or on electronic media.
S-DSS-00400	The SDSRV CI shall accept pricing information, based on disk, CPU and media utilization, from CSMS.
S-DSS-00410	The SDSRV CI shall provide actual cost information by the completion of a Service Request.
S-DSS-00420	The SDSRV CI shall record the amount of media utilized for a Distribution Request.
S-DSS-00430	The SDSRV CI shall accept the amount of media utilized from the distribution services.
S-DSS-00440	The SDSRV CI shall be capable of providing estimated Service Request Cost.

#### **4.4.1.3 Data Server Advertisement Processing**

These requirements define what the Science Data Server will advertise.

S-DSS-00450	The SDSRV CI shall provide Advertisements that indicate the class of data available from the Data Server.
S-DSS-00460	The SDSRV CI shall provide Advertisements that indicate the services available from the Data Server.
S-DSS-03810	The SDSRV CI shall have the ability to cancel the advertising of publicly available services.
S-DSS-03820	Each SDSRV CI Advertisement shall identify the service's interface.
S-DSS-03830	Each SDSRV CI Advertisement shall include Service Descriptions.

#### **4.4.1.4 Data Server Log Processing**

These requirements define the capabilities of logging and log processing that the Science Data Server CI utilizes.

S-DSS-00470	The SDSRV CI shall log all access to data in a Data Access Log.
S-DSS-00480	The SDSRV CI shall provide the capability for operations staff to view the Data Access Log.
S-DSS-00500	The SDSRV CI shall provide the capability for operations staff to sort the Data Access Log by time frame, source of access and data type.
S-DSS-00510	The SDSRV CI shall provide the capability for operations staff to select for viewing from the Data Access Log entries related to data type, source of access, or time frame.

#### **4.4.1.5 Data Server Notice Processing**

These requirements define when the Science Data Server will provide a notification to a requester.

S-DSS-00520        The SDSRV CI shall return a successful completion status to the provider of data only after all data and associated Metadata has been successfully stored.

#### **4.4.1.6 Data Server Schema Processing**

These requirements define capabilities and specifications for the Schema.

S-DSS-00530        The SDSRV CI shall provide Data Dictionary Information to the Data Management subsystem.

S-DSS-00540        The SDSRV CI shall provide Schema Information to the Data Management subsystem.

S-DSS-00550        The SDSRV CI shall provide the capability for operations staff to view Schema Information.

S-DSS-00560        The SDSRV CI shall provide the capability for operations staff to create Schema Information.

S-DSS-00570        The SDSRV CI shall provide the capability for operations staff to update Schema Information.

S-DSS-00610        The SDSRV CI shall provide the capability for operations staff to delete Schema Information.

S-DSS-03750        The SDSRV CI shall support Schema Information for each Data Type.

S-DSS-03760        The SDSRV CI Schema Information shall include for each Data Type the structure of that Data Type.

S-DSS-03770        The SDSRV CI Schema Information shall include for each Data Type the services available for that Data Type.

S-DSS-03780        The SDSRV CI Schema Information shall include for each Data Type the Data Type Attributes for that Data Type and the Valid Values associated with each Data Type Attribute.

#### **4.4.1.7 Data Server General Processing**

These requirements define general Science Data Server operating capabilities and interfaces.

S-DSS-00620        The SDSRV CI shall provide the capability to categorize messages to operations staff into informational, warnings or error categories.

S-DSS-00630        The SDSRV CI shall notify operations staff of any system error or fault.



S-DSS-00640	The SDSRV CI shall report to operations staff all errors involving file accesses.
S-DSS-00650	The SDSRV CI shall expect an acknowledgment for all messages sent to internal components of ECS
S-DSS-00660	The SDSRV CI shall acknowledge all messages from internal components of ECS
S-DSS-00670	The SDSRV CI shall be capable of receiving data from the PRONG CI.
S-DSS-00680	The SDSRV CI shall be capable of receiving data from the AITTL CI.
S-DSS-00690	The SDSRV CI shall be capable of receiving data from the PLANG CI.
S-DSS-00700	The SDSRV CI shall be capable of receiving data from FOS.
S-DSS-00710	The SDSRV CI shall be accept Data Insert Requests from other Data Servers.
S-DSS-00720	The SDSRV CI shall accept Metadata Problem Reports.
S-DSS-00730	The SDSRV CI shall provide the capability to store Metadata problem reports.
S-DSS-00732	The SDSRV CI shall provide the capability for one Data Server to accept Data Availability Schedules from another Data Server.
S-DSS-00734	The SDSRV CI shall provide the capability to store Data Availability Schedules.
S-DSS-00740	The SDSRV CI shall notify operations staff of the receipt of Metadata problem reports.
S-DSS-00750	The SDSRV CI shall provide Metadata problem reports to operations staff upon request.
S-DSS-00760	The SDSRV CI shall provide application program interfaces to all the operator functions.
S-DSS-00770	The SDSRV CI shall utilize vendor supplied tools to analyze system CPU performance.
S-DSS-00780	The SDSRV CI shall utilize vendor supplied tools to monitor the performance of query processing.
S-DSS-00790	The SDSRV CI shall utilize vendor supplied tools to analyze system storage performance.
S-DSS-00800	The SDSRV CI shall utilize vendor supplied tools to tune system throughput performance.

S-DSS-00810	The SDSRV CI shall utilize vendor supplied tools to analyze system throughput performance.
S-DSS-00820	The SDSRV CI shall provide a mechanism to control changes to the Configuration Management Data.
S-DSS-00830	The SDSRV CI shall collect Fault Management Data, such as, device failures, Service Request failures, transmission failures and general failures. This information shall be sent to the SMC for fault isolation.
S-DSS-00840	The SDSRV CI shall inform the collocated elements of ECS if resource availability falls below nominal operating parameters. This applies to staging resources and peripheral resources.
S-DSS-00850	The SDSRV CI shall provide the capability to control access to Data Server services.
S-DSS-00860	The SDSRV CI shall inform a client that a requested service is not accessible if the client attempts to access services outside their access level.
S-DSS-00870	The SDSRV CI shall allow Data Access Privileges to be configurable by User Identifier and Data Type for read, write, update, delete, and any combination thereof.
S-DSS-00880	The SDSRV CI shall use the User Identifier of the user on whose behalf a Service Request is issued as the basis for access control decisions.
S-DSS-00890	The SDSRV CI shall provide tools to the users to perform lossy compression of TBD EOS data.
S-DSS-00895	The SDSRV CI shall provide tools to the users to perform lossy decompression to TBD EOS data.
S-DSS-00900	The SDSRV CI shall support the interruption of a data base administrative or maintenance activity and its restart without loss of information.
S-DSS-00901	The SDSRV CI shall provide tools for database backup and restore.
S-DSS-00902	The SDSRV CI shall provide a database management capability that maintains database integrity during concurrent user interactions.
S-DSS-00910	The SDSRV CI shall provide tools to the users to perform lossless compression of TBD EOS data.
S-DSS-00915	The SDSRV CI shall provide tools to the users to perform lossless decompression of TBD EOS data.
S-DSS-00920	The SDSRV CI shall provide Logistics Status to the SMC.
S-DSS-00930	The SDSRV CI shall provide training information to the SMC.

S-DSS-00950	The SDSRV CI shall support the processing of Data Requests subject to access controls of read, write, update and delete, singly or in a any combination, based on data types.
S-DSS-00960	The SDSRV CI shall support the processing of Data Requests subject to access controls of read, write, update and delete, singly or in a any combination, based on data ownership.
S-DSS-00970	The SDSRV CI shall provide the capabilities to add, delete, or modify ECS Metadata to authorized users only.
S-DSS-00980	The SDSRV CI operations staff shall have the capability to receive from the SMC, maintenance directives.
S-DSS-00990	The SDSRV CI operations staff shall have the capability to receive from the SMC, directives for integration, testing, and simulation.
S-DSS-01000	The SDSRV CI operations staff shall have the capability to receive from the SMC, configuration management directives.
S-DSS-01010	The SDSRV CI operations staff shall have the capability to receive from the SMC, logistics management directives.
S-DSS-01020	The SDSRV CI operations staff shall have the capability to receive from the SMC fault management directives.
S-DSS-01030	The SDSRV CI operations staff shall have the capability to receive from the SMC security directives.
S-DSS-01035	The SDSRV CI operations staff shall have the capability to receive from the SMC scheduling directives, and scheduling adjudication directives.
S-DSS-01040	The SDSRV CI operations staff shall provide integration, testing, and simulation status to the SMC.
S-DSS-01050	The SDSRV CI operations staff shall have the capability to receive training management directives from the SMC.

#### **4.4.1.8 Session Processing**

These requirements define the capabilities and processing needs for management and tracking of sessions within the Science Data Server.

S-DSS-00290	The SDSRV CI shall accept Suspend Requests to suspend processing a client session.
S-DSS-00300	The SDSRV CI shall accept Resume Requests to resume processing of a client session.

S-DSS-01060	The SDSRV CI shall send a Notification to a client that issued a Data Request once the Data Product has been produced or when the STMGT CI has made the Data available.
S-DSS-01070	The SDSRV CI shall respond to a Data Request with a response that shall contain a status and a pointer to the data.
S-DSS-01080	The SDSRV CI shall notify operations staff in the event that data required for an on-demand data production is not accessible.
S-DSS-01090	The SDSRV CI shall maintain a list of all active Service Requests within the Data Server. The list shall include Request Priorities, Distribution Instructions, and all information necessary to process each request.
S-DSS-01100	The SDSRV CI shall provide the capability for operations staff to view the list of active Service Requests within the Data Server.
S-DSS-01120	The SDSRV CI shall provide the capability to manage multiple Service Requests from clients.
S-DSS-01130	The SDSRV CI shall provide the capability to process Service Requests asynchronously.
S-DSS-01140	The SDSRV CI shall provide the capability to list and status, Service Requests initiated by a client.
S-DSS-01150	The SDSRV CI shall log all Service Requests entered during a client session.
S-DSS-01160	The SDSRV CI shall provide periodic, asynchronous status messages to the client during the execution of a Search Request.
S-DSS-01170	The SDSRV CI shall provide the capability to monitor resource utilization on a client basis.
S-DSS-01180	For each Data Request, the SDSRV CI shall log the processing performed, the Data Products produced, any supporting data used and the recipient of the data.
S-DSS-01190	The SDSRV CI shall provide the capability for operations staff to view the resources used and allocated by a client.
S-DSS-01200	The SDSRV CI shall notify the requester in the event that an on-demand data production cannot be completed.
S-DSS-01210	The SDSRV CI shall provide Request Status to a client, concerning pending Service Requests, as specified in Appendix A.
S-DSS-01220	The SDSRV CI shall provide the capability for a client to suspend processing of a client session.

S-DSS-01230	The SDSRV CI shall automatically suspend a client session that has been inactive for a specified time.
S-DSS-01240	The SDSRV CI shall provide the capability for the operations staff to specify a "time-out" period for inactive client sessions.
S-DSS-01250	The SDSRV CI shall provide the capability to record the actions entered by the client in a Session Log.
S-DSS-01290	The SDSRV CI shall provide the capability for the operations staff to suspend all active client sessions.
S-DSS-01300	The SDSRV CI shall provide the capability for the operations staff to resume any or all client sessions, previously suspended by operations staff or clients.
S-DSS-01310	The SDSRV CI shall provide the capability for the client to resume a client session, previously suspended by the client.
S-DSS-01320	The SDSRV CI shall provide the capability for the operations staff to terminate any or all active or suspended client sessions.
S-DSS-01330	The SDSRV CI shall provide the capability for the client to terminate any or all active or suspended client sessions that were previously initiated by the client.
S-DSS-01340	The SDSRV CI shall provide the capability for the client to retrieve a Session Log.
S-DSS-01360	The SDSRV CI shall, in the event of a restart after a processing failure, recover the state of all Service Requests, including the rollback of all incomplete Data Base Transactions, and the recovery of all complete Data Base Transactions.
S-DSS-01400	The SDSRV CI shall log the termination of the processing of a Service Request.
S-DSS-01405	The SDSRV CI shall log the termination of client session.
S-DSS-01410	The SDSRV CI shall log the suspension of the processing of a Service Request or the suspension of a client session.
S-DSS-01420	The SDSRV CI shall log the resumption of a previously suspended Service Request or client session.
S-DSS-01430	The SDSRV CI shall log the initiation of the processing of a Service Request.
S-DSS-01440	The SDSRV CI shall provide client Session Status Information to the requester.

S-DSS-01450            The SDSRV CI shall provide application programming interfaces capable of supporting the development of extensions for the addition of Metadata fields that are unique to the data maintained at a specific DAAC.

#### **4.4.1.9 Data Server Subscription Processing**

These requirements define the capabilities and specifications of the subscription processing within the Science Data Server.

S-DSS-01460            The SDSRV CI shall accept Subscription Requests that specify an action to be taken and an event to initiate the action.

S-DSS-01470            The SDSRV CI shall validate Subscription Requests for one of the following events: receipt of a data type, change in core metadata, or a time interval. Time intervals will be limited to daily, weekly, or monthly.

S-DSS-01480            The SDSRV CI shall validate Subscription Requests for one of the following actions: distribution of data, send notification, collection of data for later distribution, or the initiation of a Search Request or a Data Request.

S-DSS-01490            The SDSRV CI shall process Subscription Requests at the occurrence of the specified event.

S-DSS-01500            In the event that more than one Subscription is linked to a single event, the SDSRV CI shall process the actions defined in the Subscriptions on a first-come, first-serve basis.

S-DSS-01510            The SDSRV CI shall provide the capability to notify users when data has been archived and is available for access.

S-DSS-01520            The SDSRV CI shall provide the capability to notify a user that a new version of the data has been archived.

S-DSS-01525            The SDSRV CI shall accept Subscriptions for Data Availability Schedules from the PLANG CI.

S-DSS-01530            The SDSRV CI shall provide the capability for Subscriptions to notify users via email or directly to a program interface.

S-DSS-01540            The SDSRV CI shall provide the capability to bundle notification of discrete events into a single notice to the subscriber.

S-DSS-01550            The SDSRV CI shall provide the capability for a user to request notification of data arrival.

S-DSS-01560            The SDSRV CI shall accept Subscription Update Requests to update stored Subscriptions by changing the event or the action.

S-DSS-01570            The SDSRV CI shall provide the capability for operations staff to view the stored Subscriptions.

S-DSS-01580	The SDSRV CI shall provide the capability for operations staff to update the stored Subscriptions by changing the event and/or action.
S-DSS-01590	The SDSRV CI shall provide the capability for a user client to update their stored Subscriptions by changing the action and/or event.
S-DSS-01600	The SDSRV CI shall provide the capability for operations staff to delete any stored Subscription.
S-DSS-01610	The SDSRV CI shall provide the capability for a user to delete their own stored Subscription.
S-DSS-01620	The SDSRV CI shall validate that Subscription Update Requests specify a valid Subscription Identifier and a valid replacement Subscription.
S-DSS-01630	The SDSRV CI shall provide the capability to notify a subscriber of QA changes.
S-DSS-01640	The SDSRV CI shall provide the capability to notify a subscriber on individual data granule basis.
S-DSS-01650	The SDSRV CI shall terminate continuing Subscriptions after specified time period, unless the Subscription has been renewed.
S-DSS-01660	The SDSRV CI shall provide the capability for operations staff to specify the expiration time period for Subscriptions.
S-DSS-01665	The SDSRV CI shall provide the capability for users to specify the expiration time period for Subscriptions.
S-DSS-01670	The SDSRV CI shall provide advance Notification to a client that their Subscription is about to expire.
S-DSS-01680	The SDSRV CI shall accept Subscription Renewal Requests for Subscriptions that are about to expire.
S-DSS-01690	The SDSRV CI shall provide the capability for the operations staff to designate a Subscription as "permanent" and not requiring renewal.
S-DSS-01700	The SDSRV CI shall periodically report on new events for timer-based Subscriptions and will not repeat notification of old events.

#### **4.4.1.10 Data Server Working Collection Processing**

These requirements define the capabilities of a working collection in the Science Data Server.

S-DSS-01760	The SDSRV CI shall log all reported error conditions.
S-DSS-01770	The SDSRV CI shall log all reported warning conditions.
S-DSS-01780	The SDSRV CI shall be capable of canceling the execution of a Service Request.

S-DSS-01790            The SDSRV CI shall provide access to compound data type services.

#### **4.4.1.11 Data Server Test Requirements**

These requirements define the Science Data Server test requirements.

S-DSS-01800            The LaRC DAAC SDSRV CI shall support TRMM end-to-end testing 9 months before TRMM launch.

S-DSS-01810            The MSFC DAAC SDSRV CI shall support TRMM end-to-end testing 9 months before TRMM launch.

S-DSS-01820            The SDSRV CI shall support TRMM end to end testing

#### **4.4.1.12 Data Server Performance Requirements**

These requirements define the Science Data Server performance requirements.

S-DSS-01840            The SDSRV CI shall accept and validate Datan Requests per hour as specified in Appendix E.

S-DSS-01850            The SDSRV CI shall be capable of supporting 200% growth in the number of Data Requests it accepts and validates without architecture or design change.

S-DSS-01860            The SDSRV CI shall support making stored Data Products available on physical media within 24 hours of receipt of a Media Distribution Request.

S-DSS-01870            The SDSRV CI shall support distributing product QA data produced at the collocated Data Processing Subsystem within 1 hour from the time it is ready.

S-DSS-01880            The SDSRV CI shall support making archive data associated with a predefined ECS standard format available to the network in that format within an average of 2 minutes.

S-DSS-01890            The SDSRV CI shall support making archive data associated with a predefined ECS standard format available to the network in a different format within an avg. of 5 minutes.

S-DSS-01900            The SDSRV CI shall be capable of receiving a combined maximum number of Data Requests per hour (across ECS) from the Data Management Subsystem and/or the client Subsystem as specified in Appendix E.

S-DSS-01910            The SDSRV CI shall be capable of receiving a combined maximum number of Browse Requests per hour (across ECS) from the Data Management Subsystem and/or the Client Subsystem as specified in Appendix E.



S-DSS-01920	The SDSRV CI shall support making pre-computed Browse Data available to a requester in 58 seconds after accepting and validating the request in the number of seconds specified in Appendix E.
S-DSS-01930	The DAAC SDSRV CI and STMGT CI shall be capable of accepting and storing Data Products specified in Appendix E from the PRONG CI while supporting standard product retrieval and browse data access loads.
S-DSS-01940	The DAAC SDSRV CI and STMGT CI shall be capable of ingesting product data at a maximum rate (three times the nominal rate specified in Appendix E) bytes per day from the PRONG CI until the backlog is processed, while standard product retrieval and browse data access loads are suspended.
S-DSS-01950	The SDSRV CI shall support distributing the number of bytes of data per day specified in Appendix E to the PRONG CI (in support of production) by accepting and validating the number requests per day from the PRONG CI specified in Appendix E.
S-DSS-01960	The STMGT CI shall support distributing the bytes of data per day specified in Appendix E to the PRONG CI (in support of production) by retrieving and staging the number of bytes per day for the PRONG CI specified in Appendix E.

#### **4.4.1.13 Data Type Services**

S-DSS-02900	The SDSRV CI shall provide processing services on ECS Data as listed in Appendix F.
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#### **4.4.1.14 Data Type Services - Insertion**

These requirements define the capabilities of the Science Data Server with respect to data insertion.

S-DSS-03002	The SDSRV CI shall be capable of receiving L0 - L4 Data.
S-DSS-03004	The SDSRV CI shall be capable of receiving Ancillary Data.
S-DSS-03006	The SDSRV CI shall be capable of receiving Metadata associated with Ancillary Data.
S-DSS-03010	The SDSRV CI shall be capable of receiving Calibration Data.
S-DSS-03020	The SDSRV CI shall be capable of receiving Metadata associated with Calibration Data.
S-DSS-03030	The SDSRV CI shall be capable of receiving Science Software Archive Packages.
S-DSS-03040	The SDSRV CI shall be capable of receiving Metadata associated with Science Software Archive Packages.

S-DSS-03050	The SDSRV CI shall be capable of receiving FDF Orbit Data.
S-DSS-03060	The SDSRV CI shall be capable of receiving FDF Attitude Data.
S-DSS-03100	The SDSRV CI shall be capable of receiving FDF Metadata for Orbit and Attitude data.
S-DSS-03110	The SDSRV CI shall be capable of receiving Instrument Calibration Data.
S-DSS-03120	The SDSRV CI shall be capable of receiving Metadata associated with Instrument Calibration Data.
S-DSS-03122	The SDSRV CI shall be capable of receiving real EOS instrument data to support pre-launch checkout of the ground system.
S-DSS-03124	The SDSRV CI shall be capable of receiving simulated EOS instrument data to support pre-launch checkout of the ground system.
S-DSS-03130	The SDSRV CI shall be capable of receiving Instrument Characterization Data.
\S-DSS-03150	The SDSRV CI shall be capable of receiving Instrument Historical Data.
S-DSS-03160	The SDSRV CI shall be capable of receiving Metadata associated with Instrument Historical Data.
S-DSS-03170	The SDSRV CI shall be capable of receiving Inventory Data.
S-DSS-03190	The SDSRV CI shall be capable of receiving Orbit/Attitude data.
S-DSS-03200	The SDSRV CI shall be capable of receiving Metadata associated with Orbit/Attitude data.
S-DSS-03210	The SDSRV CI shall be capable of receiving Production History.
S-DSS-03230	The SDSRV CI shall be capable of receiving Production Plans.
S-DSS-03250	The SDSRV CI shall be capable of receiving QA Statistics.
S-DSS-03260	The SDSRV CI shall be capable of receiving Metadata associated with QA Statistics.
S-DSS-03270	The SDSRV CI shall be capable of receiving scientific calibration data.
S-DSS-03280	The SDSRV CI shall be capable of receiving Metadata associated with scientific calibration data.
S-DSS-03290	The SDSRV CI shall be capable of receiving Spacecraft Historical Data.
S-DSS-03310	The SDSRV CI shall be capable of receiving TBD correlative data.
S-DSS-03320	The SDSRV CI shall be capable of receiving Metadata associated with TBD correlative data.

S-DSS-03330	The SDSRV CI shall be capable of receiving TBD Special Data Products.
S-DSS-03340	The SDSRV CI shall be capable of receiving Metadata associated with TBD Special Data Products.
S-DSS-03350	The SDSRV CI shall be capable of receiving V0 Migration Data in native format
S-DSS-03360	The SDSRV CI shall be capable of receiving Metadata associated with V0 Migration Data in native format
S-DSS-03370	Upon receipt of data types the SDSRV CI shall perform data type specific checking.
S-DSS-03380	Upon receipt of valid data types the SDSRV CI shall pass the data to the STMGT CI.

#### **4.4.1.15 Data Type Services - Data Checking**

These requirements define the capabilities of the Science Data Server with respect to data checking.

S-DSS-03390	The SDSRV CI shall update the Inventory after the Data it received for insertion into its data holdings have passed the validity checks applicable to the respective data types.
S-DSS-03400	The SDSRV CI shall verify compliance of scientist provided data with EOSDIS defined standards for file content and structure (not scientific content).
S-DSS-03410	The SDSRV CI shall verify compliance of scientist provided Metadata with EOSDIS defined standards for Metadata content and structure (not scientific content).

#### **4.4.1.16 Data Type Services - Storage**

These requirements define the capabilities of the Science Data Server with respect to data storage.

S-DSS-03412	The SDSRV CI shall interface with the STMGT CI to provide storage for L0 - L4 Data.
S-DSS-03414	The SDSRV CI shall interface with the STMGT CI to provide storage for Ancillary Data.
S-DSS-03416	The SDSRV CI shall interface with the STMGT CI to provide storage for Metadata associated with Ancillary Data.
S-DSS-03420	The SDSRV CI shall interface with the STMGT CI to provide storage for calibration data.
S-DSS-03430	The SDSRV CI shall interface with the STMGT CI to provide storage for Metadata associated with calibration data.

S-DSS-03440	The SDSRV CI shall interface with the STMGT CI to provide storage for Science Software Archive Packages.
S-DSS-03450	The SDSRV CI shall interface with the STMGT CI to provide storage for Metadata associated with Science Software Archive Packages.
S-DSS-03460	The SDSRV CI shall interface with the STMGT CI to provide storage for FDF Orbit Data for AM-1 instruments.
S-DSS-03470	The SDSRV CI shall interface with the STMGT CI to provide storage for Metadata associated with FDF Orbit Data for AM-1 instruments.
S-DSS-03480	The SDSRV CI shall interface with the STMGT CI to provide storage for instrument calibration data.
S-DSS-03490	The SDSRV CI shall interface with the STMGT CI to provide storage for Metadata associated with instrument calibration data.
S-DSS-03500	The SDSRV CI shall interface with the STMGT CI to provide storage for instrument characterization data.
S-DSS-03520	The SDSRV CI shall interface with the STMGT CI to provide storage for instrument history data.
S-DSS-03540	The SDSRV CI shall interface with the STMGT CI to provide storage for inventory characteristic data.
S-DSS-03560	The SDSRV CI shall interface with the STMGT CI to provide storage for Orbit/Attitude data.
S-DSS-03570	The SDSRV CI shall interface with the STMGT CI to provide storage for Metadata associated with Orbit/Attitude data.
S-DSS-03580	The SDSRV CI shall interface with the STMGT CI to provide storage for Production History data.
S-DSS-03600	The SDSRV CI shall interface with the STMGT CI to provide storage for production plan data.
S-DSS-03620	The SDSRV CI shall interface with the STMGT CI to provide storage for QA Statistics.
S-DSS-03630	The SDSRV CI shall interface with the STMGT CI to provide storage for Metadata associated with QA Statistics.
S-DSS-03640	The SDSRV CI shall interface with the STMGT CI to provide storage for scientific calibration data.
S-DSS-03650	The SDSRV CI shall interface with the STMGT CI to provide storage for Metadata associated with scientific calibration data.

S-DSS-03660	The SDSRV CI shall interface with the STMGT CI to provide storage for spacecraft historical data.
S-DSS-03680	The SDSRV CI shall interface with the STMGT CI to provide storage for correlative data.
S-DSS-03690	The SDSRV CI shall interface with the STMGT CI to provide storage for Metadata associated with correlative data.
S-DSS-03700	The SDSRV CI shall interface with the STMGT CI to provide storage for special Data Products.
S-DSS-03710	The SDSRV CI shall interface with the STMGT CI to provide storage for Metadata associated with special Data Products.
S-DSS-03720	The SDSRV CI shall interface with the STMGT CI to provide storage for V0 migration data.
S-DSS-03730	The SDSRV CI shall interface with the STMGT CI to provide storage for Metadata associated with V0 migration data.
S-DSS-03740	The SDSRV CI shall interface with the STMGT CI to provide storage for validated Inventory data.

#### **4.4.1.17 Data Type Services - Costing and Resource Utilization**

These requirements define the capabilities of the Science Data Server with respect to costing and resource utilization.

S-DSS-03940	The SDSRV CI shall be capable of receiving estimated disk utilization from the PLANG CI.
S-DSS-03950	The SDSRV CI shall be capable of receiving estimated CPU utilization from the PLANG CI.
S-DSS-03960	The SDSRV CI shall be capable of receiving estimated disk utilization from the STMGT CI.
S-DSS-03990	The SDSRV CI shall be capable of receiving actual disk utilization from the PLANG CI.
S-DSS-04000	The SDSRV CI shall be capable of receiving actual CPU utilization from the PLANG CI.
S-DSS-04010	The SDSRV CI shall be capable of receiving actual disk utilization from the STMGT CI.

#### **4.4.1.18 Data Type Services - Distribution**

These requirements define the capabilities of the Science Data Server with respect to distribution of data types.

S-DSS-04035	The SDSRV CI shall supply the Data Products listed in Appendix F to the DDIST CI.
S-DSS-04037	The SDSRV CI shall the Metadata associated with the Data Products listed in Appendix F to the DDIST CI.
S-DSS-04040	The SDSRV CI shall supply calibration data to the DDIST CI.
S-DSS-04050	The SDSRV CI shall supply Metadata associated with calibration data to the DDIST CI.
S-DSS-04060	The SDSRV CI shall supply Science Software Archive Packages to the DDIST CI.
S-DSS-04070	The SDSRV CI shall supply Metadata associated with Science Software Archive Packages to the DDIST CI.
S-DSS-04080	The SDSRV CI shall supply FDF repaired orbit data for AM-1 instruments packages to the DDIST CI.
S-DSS-04090	The SDSRV CI shall supply Metadata associated with FDF repaired orbit data for AM-1 instruments to the DDIST CI.
S-DSS-04100	The SDSRV CI shall supply instrument calibration data to the DDIST CI.
S-DSS-04110	The SDSRV CI shall supply Metadata associated with instrument calibration data to the DDIST CI.
S-DSS-04120	The SDSRV CI shall supply instrument characterization data to the DDIST CI.
S-DSS-04130	The SDSRV CI shall supply Metadata associated with instrument characterization data to the DDIST CI.
S-DSS-04140	The SDSRV CI shall supply instrument historical data to the DDIST CI.
S-DSS-04150	The SDSRV CI shall supply Metadata associated with instrument historical data to the DDIST CI.
S-DSS-04160	The SDSRV CI shall supply inventory characteristic data to the DDIST CI.
S-DSS-04170	The SDSRV CI shall supply Metadata associated with inventory characteristic data to the DDIST CI.
S-DSS-04180	The SDSRV CI shall supply Orbit/Attitude Data to the DDIST CI.
S-DSS-04190	The SDSRV CI shall supply Metadata associated with Orbit/Attitude Data to the DDIST CI.

S-DSS-04200	The SDSRV CI shall supply Production History data to the DDIST CI.
S-DSS-04210	The SDSRV CI shall supply Metadata associated with Production History data to the DDIST CI.
S-DSS-04220	The SDSRV CI shall supply production plan data to the DDIST CI.
S-DSS-04230	The SDSRV CI shall supply Metadata associated with production plan data to the DDIST CI.
S-DSS-04240	The SDSRV CI shall supply QA Statistics to the DDIST CI.
S-DSS-04250	The SDSRV CI shall supply Metadata associated with QA Statistics to the DDIST CI.
S-DSS-04260	The SDSRV CI shall supply scientific calibration data to the DDIST CI.
S-DSS-04270	The SDSRV CI shall supply Metadata associated with scientific calibration data to the DDIST CI.
S-DSS-04280	The SDSRV CI shall supply spacecraft historical data to the DDIST CI
S-DSS-04290	The SDSRV CI shall supply Metadata associated with spacecraft historical data to the DDIST CI.
S-DSS-04300	The SDSRV CI shall supply correlative data sets to the DDIST CI
S-DSS-04310	The SDSRV CI shall supply Metadata associated with correlative data sets to the DDIST CI.
S-DSS-04320	The SDSRV CI shall supply special Data Products to the DDIST CI.
S-DSS-04330	The SDSRV CI shall supply Metadata associated with special Data Products to the DDIST CI.
S-DSS-04340	The SDSRV CI shall supply V0 migration Data Products to the DDIST CI.
S-DSS-04350	The SDSRV CI shall supply Metadata associated with V0 migration Data Products to the DDIST CI.

#### **4.4.1.19 Data Type Services - Inventory**

These requirements define the capabilities of the Science Data Server with respect to inventory processing.

S-DSS-04360	The SDSRV CI shall include granule-specific information as defined in the SDPS Core Metadata Baseline (194-00269TPW).
S-DSS-04390	Standard Product related Metadata at the Data Server shall include Metadata associated with static subsetted, subsampled, and summary products.
S-DSS-04570	The SDSRV CI shall provide services to add to the existing Inventory

S-DSS-04580	The SDSRV CI shall provide services to delete from the existing Inventory
S-DSS-04590	The SDSRV CI shall provide services to modify the existing Inventory
S-DSS-04600	The SDSRV CI shall update the Metadata for a data item whenever an unexpected loss occurs.
S-DSS-04610	The SDSRV CI shall update the Metadata whenever a data item is updated.
S-DSS-04620	The SDSRV CI shall update the Metadata for a data item that has been purged from the system.
S-DSS-04630	The SDSRV CI shall update the Metadata whenever a data item is relocated to another site.
S-DSS-04640	The SDSRV CI shall provide services to retrieve Metadata from the Inventory.
S-DSS-04650	The SDSRV CI shall accept Search Requests
S-DSS-04660	The SDSRV CI shall provide Result Sets to the client, in response to Search Requests
S-DSS-04670	The SDSRV CI shall support Inventory searches based on the Core Inventory Metadata.
S-DSS-04680	The SDSRV CI shall support Inventory searches based on the Product Specific Metadata.
S-DSS-04690	The SDSRV CI shall support Inventory searches based on a combination of the Core Inventory Metadata and Product Specific Metadata.
S-DSS-04700	The SDSRV CI shall provide Search Results to requesting agencies.
S-DSS-04710	The SDSRV CI shall respond to a query with a null Result Set, if no products in the Inventory meet the specified criteria.

#### **4.4.1.20 Data Type Services - DARs**

These requirements define the capabilities of the SDSRV CI with respect to the processing of Data Acquisition Requests (DARs). The format of a DAR is given in Appendix A.

S-DSS-04720	The SDSRV CI shall provide DARs to ASTER ICC.
S-DSS-04730	The SDSRV CI shall accept DARs from the client.
S-DSS-04740	The SDSRV CI shall provide DAR status to the client, in response to DAR Status Requests.
S-DSS-04745	The SDSRV CI shall provide operations staff with the ability to display and list outstanding DARs that are accessible by the Data Server.
S-DSS-04750	The SDSRV CI shall accept DAR Status from IPs



- S-DSS-04760      The SDSRV CI shall accept Subscription Requests from the client linked to a specified, existing DAR.
- S-DSS-04770      The SDSRV CI shall send DAR Status Requests to ASTER ICC.
- S-DSS-04780      The SDSRV CI shall receive DAR Status from the ASTER ICC.

#### **4.4.1.21 Data Type Services - Status**

- S-DSS-03860      The SDSRV CI shall be capable of receiving status from the PRONG CI.
- S-DSS-03862      The SDSRV CI shall be capable of sending status to the PRONG CI.
- S-DSS-03864      The SDSRV CI shall be capable of receiving status from the PLANG CI.
- S-DSS-03866      The SDSRV CI shall be capable of sending status to the PLANG CI.
- S-DSS-03868      The SDSRV CI shall be capable of sending status to the WKBCH CI.
- S-DSS-03870      The SDSRV CI shall be capable of receiving status from the INGST CI.
- S-DSS-03872      The SDSRV CI shall be capable of sending status to the INGST CI.
- S-DSS-03874      The SDSRV CI shall be capable of receiving status from the LIMGR CI.
- S-DSS-03876      The SDSRV CI shall be capable of sending status to the LIMGR CI.

#### **4.4.1.22 Mediation Services**

The following requirements apply to mediation services which are used in monitoring Service Requests and in acquiring appropriate directions from the user at key decision points.

- S-DSS-01350      The SDSRV CI shall be able to notify clients of events associated with Service Requests or sessions which require additional instructions from the client, e.g., when requests exceed a client specified threshold.
- S-DSS-01370      The SDSRV CI shall provide the client with the capability to respond to notifications of events which require instructions from the client.
- S-DSS-01380      The SDSRV CI shall provide the client the capability to specify the entry point to be used for this asynchronous notification in asynchronous Service Requests.
- S-DSS-01390      The SDSRV CI shall provide the capability for clients to indicate that they do not wish to receive asynchronous notifications and provide default instructions for such notification events.

#### **4.4.2 DDSRV - Document Data Server CSCI**

The Document Data Server will function in a similar manner as other Data Servers, but will exclusively handle documentation. Access to this Data Server may be limited to a single protocol

which is specifically designed for document handling (e.g., HTTP). In other respects, the Document Data Server will provide functionality consistent with other Data Servers in the system.

#### **4.4.2.1 Processing**

These requirements define the services and capabilities that the document Data Server will provide.

S-DSS-10010	The guide shall be maintained on-line by the DDSRV CI.
S-DSS-10020	The DDSRV CI shall accept Subscriptions from the client.
S-DSS-10030	The DDSRV CI shall support storage, retrieval and searching of documents in HTML format.
S-DSS-10040	The DDSRV CI shall accept Documents from the INGST CI.
S-DSS-10050	The DDSRV CI shall provide documents to requesting agencies.
S-DSS-10051	The DDSRV CI shall provide the capability to add, delete, or modify individual ECS Metadata entries.
S-DSS-10055	The DDSRV CI shall provide, to qualified users, access to all documents and data types held in the server's collection.
S-DSS-10060	The DDSRV CI shall provide access to the ECS guide (documentation/reference material) and guide services.
S-DSS-10070	The DDSRV CI shall store, maintain and provide data management services for ECS guide (documentation/reference material).
S-DSS-10080	The DDSRV CI shall provide the capability to add, delete, or modify groups of ECS Metadata entries.
S-DSS-10090	The DDSRV CI shall be capable of receiving documentation of processing algorithms used for EOS and other Earth Science Data Products generated by the ECS
S-DSS-10100	The DDSRV CI shall be capable of receiving references to results of science data quality assessments of EOS data
S-DSS-10110	The DDSRV CI shall be capable of receiving bibliography information of published and unpublished literature (as available) derived from the project
S-DSS-10120	The DDSRV CI shall be capable of providing cross references between differing studies of the same data
S-DSS-10130	The DDSRV CI shall be capable of receiving other documents relevant to quality assessment of EOS data
S-DSS-10140	The DDSRV CI shall provide the capability to receive data describing format and media options available for a given data set.

S-DSS-10150	The DDSRV CI shall be capable of receiving instrument specifications
S-DSS-10160	The DDSRV CI shall provide the capability to receive summaries of data sets derived from observation logs
S-DSS-10170	The DDSRV CI shall receive user supplied documents in HTML & ASCII
S-DSS-10180	The DDSRV CI shall provide the capability to receive data describing subsetting, subsampling, and transformation options available for a given data set.
S-DSS-10184	The DDSRV CI shall notify operations staff of any system error or fault.
S-DSS-10186	The DDSRV CI shall report to operations staff all errors involving file accesses.
S-DSS-10190	The DDSRV CI shall receive Guide Data from Version 0 in HTML & ASCII
S-DSS-10200	The DDSRV CI shall provide the capability to ingest documentation in ASCII text format.
S-DSS-10202	The DDSRV CI shall provide the capability to ingest documentation in Microsoft WORD format.
S-DSS-10204	The DDSRV CI shall provide the capability to ingest documentation in HTML format.
S-DSS-10206	The DDSRV CI shall provide the capability to ingest documentation in Interleaf format.
S-DSS-10208	The DDSRV CI shall provide the capability to ingest documentation in WordPerfect format.
S-DSS-10210	The DDSRV CI shall receive information that describes spacecraft-housekeeping and Ancillary Data parameters stored in the Science Data Server.
S-DSS-10220	The DDSRV CI shall receive Guide Data from Version 0.
S-DSS-10230	The DDSRV CI shall provide application programming interfaces that support addition of documents for use as Guide data for DAAC-specific Data Products.

#### **4.4.2.2 Document Data Server Interfaces**

These requirements define the external entities that the document Data Server will interface with, as well as the interfaces that the document Data Server will provide.

S-DSS-10240	Upon receipt of all supported document formats and descriptive data, the DDSRV CI shall provide storage for the document and/or data.
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S-DSS-10250	Upon receipt and successful storage of all supported document formats and descriptive data, the DDSRV CI shall provide access to the document and/or data.
S-DSS-10260	The DDSRV CI shall provide application programming interfaces that support development of extensions for addition of documents for use as Guide data for DAAC-specific Data Products.
S-DSS-10290	The DDSRV CI shall supply documents to the DDIST CI.

#### **4.4.2.3 Document Data Server Performance Requirements**

These requirements define the performance capabilities of the document Data Server.

S-DSS-10300	The DDSRV CI shall complete a search for a guide document by a single keyword in not exceeding 8 seconds.
S-DSS-10305	The DDSRV CI shall complete a directory search using a single keyword in a period to exceed 8 seconds.
S-DSS-10306	The DDSRV CI shall complete a directory search using multiple keywords in a period not to exceed 13 seconds.
S-DSS-10310	The DDSRV CI shall complete a keyword search on a 1000 page document of not exceeding 3 seconds.
S-DSS-10320	The DDSRV CI shall accept and validate the number of Distribution Requests per hour specified in Appendix E.
S-DSS-10330	The DDSRV CI shall be capable of supporting 200% growth in the number of Distribution Requests it accepts and validates without architecture or design change.
S-DSS-10340	The DDSRV CI shall support making stored documents available on physical media within 24 hours of receipt of a Media Distribution Request.
S-DSS-10350	The DDSRV CI shall be capable of receiving a combined maximum of product orders per hour as specified in Appendix E (across ECS) from the Data Management Subsystem and/or the Client subsystem.
S-DSS-10360	The DDSRV CI shall be capable of accepting and storing documents and related data at a nominal rate specified in bytes per day in Appendix E from external clients while supporting standard data retrieval and access loads.

#### **4.4.3 STMGT- Storage Management Software CSCI**

The Storage Management Software CSCI provides a generalization of the interfaces to the various data resources managed by the Data Server subsystem. The Storage Management Software CSCI provides a single interface for making large objects (i.e., "typed files") persistent in a multi-tiered storage architecture, and instantiating them from storage into memory or onto staging devices for

direct access by science software. It will update the persistent state of these objects, or remove them from persistent storage.

The Storage Management Software CSCI also provides a general interface to the storage hardware, including archive tape libraries, tape recorders, staging space devices, and hard media peripherals used for ingesting and distributing data. The Data Server subsystem includes several different types of storage services. A given storage service may offer a variation of that general interface which provides functions that are unique to that particular type of storage.

The Storage Management Software CSCI interface allows its clients to specify semantics of storage requirements which then may select a specific type or pool of storage. For example, it may be desirable from a resource management perspective to store the data search results on a specific set of devices, and to monitor storage allocation to protect the server against shutdown due to storage overflow. One of the purposes of the Storage Management Software CSCI is to separate the semantics of storage requirements from the semantics of device types, storage and data management technologies, and interface syntax.

#### **4.4.3.1 Archive Request Processing**

These requirements define the processing for the receipt and execution of requests for archive.

S-DSS-20010	The STMGT CI shall validate all Service Requests.
S-DSS-20020	The STMGT CI shall accept Insert Requests for insertion of data into the archive.
S-DSS-20025	The STMGT CI shall place an entry in the Archive Activity Log corresponding to each Insert Request.
S-DSS-20030	The STMGT CI shall check each Insert Request it receives for the correct type of data in all fields. Fields that shall be checked include Request Identifier, date of request, Priority Information, data type and original identifier.
S-DSS-20040	The STMGT CI shall accept Retrieve Requests for data. Each Retrieve Request shall include the granule id(s) for the data. Granule id was assigned when granule was originally archived. The granule id serves as a unique data identifier.
S-DSS-20045	The STMGT CI shall place an entry in the Archive Activity Log corresponding to each Retrieve Request.
S-DSS-20050	The STMGT CI shall check each Retrieve Request it receives for correct type of data in all fields. Fields that shall be checked include Request Identifier, date of request, date and time for requested data, Priority Information, and data type.
S-DSS-20060	The STMGT CI shall accept Archive Status Requests for the status of ongoing Insert and Retrieve Requests.

S-DSS-20065	The STMGT CI shall place an entry in the Archive Activity Log corresponding to each Archive Status Request.
S-DSS-20070	The STMGT CI shall check each Archive Status Request it receives for the correct type of data in all fields. Fields that shall be checked include Request Identifier and Request Identifier of previous Insert or Retrieve Requests.
S-DSS-20080	The STMGT CI shall maintain an Archive Activity Log of all Service Requests received. The log of Service Requests shall be in chronological order and shall include a Request Identifier, the operation requested, completion status of request and a date/time stamp.

#### **4.4.3.2 Archive Processing**

These requirements define the processing that the storage management CI will perform for the archive.

S-DSS-04370	The STMGT CI shall have the ability to store product specific Metadata.
S-DSS-04380	The STMGT CI shall store the following Metadata: granule id, date and time of storage, physical storage location, data check status and data format type.
S-DSS-04400	The STMGT CI shall have the ability to store references to calibration data as Metadata for science data.
S-DSS-04410	The STMGT CI shall have the ability to store references to Orbit/Attitude Data as Metadata for science data.
S-DSS-04420	The STMGT CI shall have the ability to store references to instrument engineering data as Metadata for science data.
S-DSS-04430	The STMGT CI shall have the ability to store references to Science Software Archive Packages as Metadata for science data.
S-DSS-04440	The STMGT CI shall have the ability to store references to data generation software as Metadata for science data.
S-DSS-04450	The STMGT CI shall have the ability to store references to Production History data as Metadata for science data.
S-DSS-04460	The STMGT CI shall have the ability to store references to data recipients as Metadata for science data.
S-DSS-04470	The STMGT CI shall have the ability to store references to the data production facility as Metadata for science data.
S-DSS-04475	The STMGT CI shall have the ability to store documents and/or data from the DDSRV CI.

S-DSS-04480	The STMGT CI shall have the ability to store references to QA Statistics as Metadata for science data.
S-DSS-04490	The STMGT CI shall have the ability to store references to reference documentation as Metadata for science data.
S-DSS-04500	The STMGT CI shall have the ability to indicate the need for on-demand product generation as Metadata for science data.
S-DSS-04510	The STMGT CI shall provide the capability to logically group a set of granule ids such that the set can be referenced by a single identifier.
S-DSS-04520	The STMGT CI shall provide the capability to validate metadata before insertion into the Inventory.
S-DSS-04530	The STMGT CI shall provide the capability to validate updated metadata before insertion into the Inventory.
S-DSS-04540	The STMGT CI shall reject metadata which fails one or more validations constraints.
S-DSS-20090	The STMGT CI shall maintain an Inventory Update Log. The following information shall be recorded: time and date of update, unique data identifier, archive media name, source of data, storage device name and requester.
S-DSS-20100	The STMGT CI shall provide operations staff personnel the capability to manually access archive media resident in storage devices.
S-DSS-20110	The STMGT CI shall provide operations staff the capability to insert archive media into storage devices which support removable media.
S-DSS-20120	The STMGT CI shall provide operations staff the capability to remove archive media from storage devices which support removable media.
S-DSS-20125	The STMGT CI shall, where appropriate, comply with the evolving guidelines and standards emerging from the IEEE Reference Model for Open Storage Systems Interconnection.
S-DSS-20130	The STMGT CI shall provide operations staff the capability to manually dismount archive media.
S-DSS-20140	The STMGT CI shall provide operations staff the capability to manually mount archive media.
S-DSS-20150	The STMGT CI shall provide operations staff the capability to manually dismount backup archive media.
S-DSS-20160	The STMGT CI shall provide operations staff the capability to manually mount backup archive media.

S-DSS-20170	The STMGT CI shall automatically request operations staff to load a new archive media to store data if no media exists with sufficient space for the new data.
S-DSS-20180	The STMGT CI shall have the capability to automatically dismount archive media from storage devices which support removable media when different archive media must be mounted to store data.
S-DSS-20190	The STMGT CI shall have the capability to automatically dismount archive media from storage devices which support removable media when different archive media must be mounted to retrieve data.
S-DSS-20200	The STMGT CI shall provide a mechanism to remove archive media from storage devices to allow insertion of new or different archive media in the storage device.
S-DSS-20210	For any EOS Level 0 or L1A (if L0 is not available) data item that can not be located or is inaccessible and can not be re-created, the STMGT CI shall automatically request the data item be re-ingested from EDOS.
S-DSS-20220	If an uncorrectable error occurs during archive, the STMGT CI shall notify the operations staff, select a different piece of Media and complete the archive operation. Note: Contents of original media shall be recreated on new media and the original removed from system.
S-DSS-20230	The STMGT CI shall notify operations staff to discard source archive media after its contents have been re-created on the new media.
S-DSS-20240	If the end of the archive media is encountered before completing a write operation, the STMGT CI shall select new media and complete the write operation with the new archive media.
S-DSS-20250	If an uncorrectable error occurs during retrieval operations, STMGT CI shall terminate the operation and notify operations staff and the user/data requester of the failure.
S-DSS-20255	If an uncorrectable error occurs during retrieval operations, STMGT CI shall automatically recreate the contents on new media.
S-DSS-20260	For each piece of archive media, the STMGT CI shall provide the capability to display the length of time to store data on the media before deletion.
S-DSS-20270	The STMGT CI shall provide the capability to change the length of time to store data on archive media before deletion of the data.
S-DSS-20280	The STMGT CI shall provide the capability to directly notify users when Data Products will be deleted.
S-DSS-20290	The STMGT CI shall provide the capability to indirectly notify users when Data Products will be deleted via a bulletin board type mechanism.



S-DSS-20300	The STMGT CI shall provide operations staff the capability to display information about the archive media resident in storage devices. Such information shall include: archive volume name, creation time/date, archive volume status.
S-DSS-20310	The STMGT CI shall provide a mechanism to monitor archive media degradation.
S-DSS-20320	The STMGT CI shall provide operations staff a mechanism to display/view degradation information for any selected archive media.
S-DSS-20330	The STMGT CI shall provide the capability to automatically refresh archive media, to prevent data loss due to media degradation, periodically as specified by operations staff.
S-DSS-20340	The STMGT CI shall provide operations staff the capability to change the time period used for monitoring degradation of archive media.
S-DSS-20350	The STMGT CI shall use a fully described file structure to store data.
S-DSS-20360	The STMGT CI shall use a fully described physical file organization to store data.
S-DSS-20370	The STMGT CI shall use openly published and non-proprietary data formats to store data.
S-DSS-20380	The STMGT CI shall provide the capability to continue operations in a degraded mode despite hardware failures of individual archive storage devices, archive media and/or operator consoles.
S-DSS-20390	The STMGT CI shall provide operations staff a mechanism for recovery of data as a result of failed archive media. Note: Failed archive media are media which can not be read.
S-DSS-20400	The STMGT CI shall provide operations staff a mechanism for recovery of data as a result of failed archive storage devices.
S-DSS-20420	The STMGT CI shall be capable of producing backup archive media which uses openly published and non-proprietary formats for recording data.
S-DSS-20430	The STMGT CI shall be capable of producing backup archive media which has a fully described file structure.
S-DSS-20440	The STMGT CI shall be capable of producing backup archive media which has a fully described physical file organization.
S-DSS-20442	The STMGT CI shall provide the capability to archive Data Availability Schedules.
S-DSS-20444	The STMGT CI shall provide the capability to retrieve Data Availability Schedules.

S-DSS-20450	The STMGT CI shall provide the capability to archive real EOS instrument data to support pre-launch checkout of the ground system.
S-DSS-20455	The STMGT CI shall provide the capability to retrieve real EOS instrument data to support pre-launch check out of ground systems.
S-DSS-20460	The STMGT CI shall provide the capability to archive simulated EOS instrument data to support pre-launch checkout of the ground system.
S-DSS-20465	The STMGT CI shall provide the capability to archive non-EOS data required for standard production.
S-DSS-20470	The STMGT CI shall provide the capability to retrieve simulated EOS instrument data to support pre-launch checkout of the ground system.
S-DSS-20475	The STMGT CI shall provide the capability to retrieve non-EOS data to be used for standard product production.
S-DSS-20480	The STMGT CI shall provide operations staff the capability to perform physical inventories of archive media resident in archive storage devices.
S-DSS-20490	The STMGT CI shall control access to archived data to prevent unauthorized access.
S-DSS-20500	The STMGT CI shall report unauthorized attempts to access archived data when detected to operations staff.

#### **4.4.3.3 Archive Configuration Processing**

These requirements define the processing that the storage management CI will perform for the archive configuration.

S-DSS-20510	The STMGT CI shall provide operations staff the capability to obtain configuration information about operator selected storage devices.
S-DSS-20520	The STMGT CI shall provide operations staff the capability to change the allocation of storage devices to individual Data Servers.
S-DSS-20530	The STMGT CI shall provide the capability to display/view/print the allocation of storage devices to Data Servers.
S-DSS-20540	The STMGT CI shall provide an automatic capability during startup to allocate storage devices to Data Servers.
S-DSS-20550	The STMGT CI shall provide operations staff a mechanism to display/view storage system operating parameters which affect storage system performance.
S-DSS-20560	The STMGT CI shall provide operations staff a mechanism to display/view storage system operating parameters which affect storage system scheduling.

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| S-DSS-20570 | The STMGT CI shall provide operations staff the capability to change storage system operating parameters which affect storage system performance.   |
| S-DSS-20580 | The STMGT CI shall provide operations staff the capability to change storage system operating parameters which affect storage system scheduling.  |
| S-DSS-20590 | The STMGT CI shall provide archival storage which is field-expandable. Field-expandable is defined as increasing the capacity or size of archive storage without removing archive storage device from site. |

#### **4.4.3.4 Archive Data Type Processing**

These requirements define the data type specific processing that the archive will perform.

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| S-DSS-20600 | The STMGT CI shall provide the capability to uniquely identify each data granule that is archived.   |
| S-DSS-20610 | The STMGT CI shall provide the capability to archive multiple versions of Data Granules.   |
| S-DSS-20620 | The STMGT CI shall provide the capability to retrieve each individual data granule that is stored.   |
| S-DSS-20630 | The STMGT CI shall, on a periodic basis, scan data holdings selected by operations staff, to insure the presence of archived data. The periodic basis shall be selectable by operations staff. |
| S-DSS-20640 | The STMGT CI shall provide operations staff the capability to modify the time periods for scanning its data holdings.  |
| S-DSS-20650 | The STMGT CI shall provide operations staff the capability to generate a backup of all data holdings.  |
| S-DSS-20660 | The STMGT CI shall provide operations staff the capability to restore backups of specified data holdings.  |
| S-DSS-20670 | For each data item archived, the STMGT CI shall record the event in the Inventory Update Log.  |
| S-DSS-20690 | The STMGT CI shall provide the capability to display/view/print the Inventory Update Log.  |
| S-DSS-20700 | The STMGT CI shall provide the capability to select/extract Inventory Update Log records for time periods selected by operations staff.  |
| S-DSS-20710 | The STMGT CI shall assign a unique identifier to each archive media.   |
| S-DSS-20720 | The STMGT CI shall provide a mechanism to mark data for deletion. The mechanism shall be based on selection of max time to store data before it's  |

deleted from storage. It shall also mark earlier versions when multiple versions have been archived.

- S-DSS-20730 The STMGT CI shall provide a mechanism to automatically delete archived data which has been marked for deletion.
- S-DSS-20740 The STMGT CI shall provide operations staff the capability to retrieve data that has been safe-stored at an external facility.
- S-DSS-20750 For data retrieval requests for L0 data from EDOS, STMGT CI shall satisfy such requests with appropriate L0 or L1A data. Note: These instruments provide L0 data, CERES, LIS, ASTER, MISR, MODIS, MOPPIT; these provide L1A data, LIS, PR, TMI, VIRS.

#### **4.4.3.5 Archive Log Processing**

These requirements define the capabilities of logging and log processing that the archive CI utilizes.

- S-DSS-20760 The STMGT CI shall provide operations staff the capability to view/display/print the Archive Activity Log.
- S-DSS-20770 The STMGT CI shall provide the capability to sort, extract and/or select Archive Activity Log entries by the following: start/stop time, operation requested, result of request.
- S-DSS-20780 The STMGT CI shall provide operations staff the capability to view/display/print the Intermediate Activity Log.
- S-DSS-20790 The STMGT CI shall provide the capability to sort, extract and/or select Intermediate Activity Log entries by the following: start/stop time, intermediate operation, Request Identifier, and staging resource(s).

#### **4.4.3.6 Archive Resource Management**

These requirements define the capabilities that the storage management CI will provide to manage and access the various resources.

- S-DSS-20800 The STMGT CI shall use operator selectable criteria to determine the physical storage device that data types will be stored in. This criteria shall consider: current store and retrieval activity, number of storage devices, type of data to be stored.
- S-DSS-20810 The STMGT CI shall provide operations staff the capability to manually alter the criteria that determines the physical storage device that data sets will be stored in.
- S-DSS-20820 The STMGT CI shall provide operations staff the capability to alter the criteria that determines removal of archive media from storage devices to allow insertion of new or different archive media in the storage device.

S-DSS-20830	In determining the archive media to be removed the criteria shall consider the media's capacity for storing additional data, the last time data was accessed on the media and whether the media is currently in use to store or retrieve data.
S-DSS-20840	The STMGT CI shall report information on the storage system. Information reported shall include file access time, file accesses per hour, size of files stored onto archive media, size of files retrieved from archive media, amount of storage allocated.
S-DSS-20850	The STMGT CI shall collect information on the storage system. Information shall include avg access time, avg # of accesses per hour, mean request inter-arrival time, avg file size stored, avg file size retrieved and avg file residency time on disk.
S-DSS-20860	The STMGT CI shall provide a mechanism to monitor the performance of the ECS archival storage system.
S-DSS-20870	The STMGT CI shall provide operations staff the capability to view/display performance information on the storage system.

#### **4.4.3.7 Archive Resource Services**

These requirements define the services that the storage management CI will provide for the various resources.

S-DSS-20880	The STMGT CI shall maintain an Intermediate Activity Log. It shall include date/time stamp, operation id (file space alloc./dealloc., media mount/dismount/loads/unload, file read/write/delete), affiliated Request Identifier and associated staging resources.
S-DSS-20890	The STMGT CI shall provide operations staff the capability to load media into storage devices which support removable media.
S-DSS-20900	The STMGT CI shall provide operations staff the capability to initialize media in storage devices which support removable media.
S-DSS-20910	The STMGT CI shall provide operations staff the capability to unload media from storage devices which support removable media.
S-DSS-20920	The STMGT CI shall provide a mechanism to statistically monitor the correctable bit error rate (BER) of archive media. Monitoring period times shall be selectable by operations staff.
S-DSS-20925	The STMGT CI shall provide a mechanism to statistically monitor the raw bit error rate (BER) of archive media.
S-DSS-20935	The STMGT CI shall notify operations staff if raw BER exceeds an operator selectable threshold.

S-DSS-20940	The STMGT CI shall provide operations staff the capability to change time periods used for monitoring bit error rates.
S-DSS-20950	The STMGT CI shall provide operations staff the capability to change BER related thresholds that determine when operations staff is notified of errors.
S-DSS-20960	The STMGT CI shall automatically re-create the archive media if the raw BER exceeds a threshold specified by operations staff.
S-DSS-20970	The STMGT CI shall provide operations staff the capability to change BER related thresholds that determine when archive media is re-created.
S-DSS-20980	The STMGT CI shall provide the SDSRV CI the capability to open files on archive storage media in the DRPHW CI.
S-DSS-20985	The STMGT CI shall provide the SDSRV CI the capability to open files on archive storage media in the WKSHW CI.
S-DSS-20990	The STMGT CI shall provide the SDSRV CI the capability to close files on archive storage media in the DRPHW CI.
S-DSS-20995	The STMGT CI shall provide the SDSRV CI the capability to close files on archive storage media in the WKSHW CI.
S-DSS-21000	The STMGT CI shall provide the SDSRV CI the capability to read information from files on archive storage media in the DRPHW CI.
S-DSS-21005	The STMGT CI shall provide the SDSRV CI the capability to read information from files on archive storage media in the WKSHW CI.
S-DSS-21010	The STMGT CI shall provide the SDSRV CI the capability to write information into files on archive storage media in the DRPHW CI.
S-DSS-21015	The STMGT CI shall provide the SDSRV CI the capability to write information into files on archive storage media in the WKSHW CI.
S-DSS-21020	The STMGT CI shall provide the SDSRV CI the capability to allocate archive storage devices for Service Request processing in the DRPHW CI.
S-DSS-21025	The STMGT CI shall provide the SDSRV CI the capability to allocate archive storage devices for Service Request processing in the WKSHW CI.
S-DSS-21030	The STMGT CI shall provide the SDSRV CI the capability to deallocate archive storage devices in the DRPHW CI.
S-DSS-21035	The STMGT CI shall provide the SDSRV CI the capability to deallocate archive storage devices in the DRPHW CI.
S-DSS-21040	The STMGT CI shall provide the SDSRV CI the capability to open files on staging devices in the WKSHW CI.

S-DSS-21050	The STMGT CI shall provide the SDSRV CI the capability to close files on staging devices in the WKSHW CI.
S-DSS-21060	The STMGT CI shall provide the SDSRV CI the capability to write information into files on staging devices in the WKSHW CI.
S-DSS-21070	The STMGT CI shall provide the SDSRV CI the capability to read information from files on staging devices in the WKSHW CI.
S-DSS-21080	The STMGT CI shall provide the SDSRV CI the capability to delete files on staging devices in the WKSHW CI.
S-DSS-21090	The STMGT CI shall provide the SDSRV CI the capability to rename files on staging devices in the WKSHW CI.
S-DSS-21100	The STMGT CI shall provide the SDSRV CI the capability to obtain information concerning files on staging devices in the WKSHW CI. Note: File info. includes file name, size, type, organization, creation date, protections, owner, last access time and id of last entity to access file.
S-DSS-21110	The STMGT CI shall provide the SDSRV CI the capability to allocate storage on staging devices in the WKSHW CI.
S-DSS-21120	The STMGT CI shall provide the SDSRV CI the capability to deallocate storage on staging devices in the WKSHW CI.
S-DSS-21130	The STMGT CI shall provide estimates of staging device time delays for subsetted Data Requests.
S-DSS-21140	The STMGT CI shall provide estimates of staging device time delays for subsampled Data Requests.
S-DSS-21150	The STMGT CI shall provide estimates of staging device time delays for summary Data Requests.
S-DSS-21160	The STMGT CI shall provide operations staff the capability to set the operational state (UP or DOWN) of storage devices.
S-DSS-21170	The STMGT CI shall provide operations staff the capability to query the operational state (UP or DOWN) of storage devices.
S-DSS-21180	The STMGT CI shall provide operations staff the capability to backup storage system unique files, which shall include all logs, files used by the storage system and files indicating the allocation of storage devices to Data Servers.
S-DSS-21190	The STMGT CI shall provide operations staff the capability to restore storage system unique files.
S-DSS-21200	The STMGT CI shall provide operations staff a mechanism to display/view storage system data storing operations by ECS element.

S-DSS-21210	The STMGT CI shall provide operations staff a mechanism to display/view storage system data retrieval operations by ECS element.
S-DSS-21220	The STMGT CI shall provide operations staff a mechanism to display/view storage system archive media backup/restore operations by ECS element.
S-DSS-21230	The STMGT CI shall provide operations staff a mechanism to display/view storage system storage allocations by ECS element.
S-DSS-21240	The STMGT CI shall provide operations staff a mechanism to display/view storage system utilization by ECS element.
S-DSS-21250	The STMGT CI shall provide operations staff a mechanism to display/view storage system performance by ECS element.
S-DSS-21260	The STMGT CI shall provide operations staff a mechanism to display/view storage system cost by ECS element.
S-DSS-21270	The STMGT CI shall provide the operations staff the capability to display information about archive storage devices. Such information shall include current status, current operation, # operations completed, # errors reported, time/date of last error.
S-DSS-21280	The STMGT CI shall provide application programming interfaces (APIs) to support Insert Requests.
S-DSS-21290	The STMGT CI shall provide application programming interfaces (APIs) to support Retrieval Requests.
S-DSS-21300	The STMGT CI shall provide application programming interfaces (APIs) to support Status Requests related to previous Insert Requests.
S-DSS-21310	The STMGT CI shall provide application programming interfaces (APIs) to support Status Requests related to previous Retrieval Requests.
S-DSS-21320	The STMGT CI shall provide the capability to estimate time delays for data retrievals due to contention for hardware resources.
S-DSS-21330	The STMGT CI shall notify operations staff whenever a device failure condition occurs. Such failures shall also be logged in the Archive Activity Log.

#### **4.4.3.8 Billing/Accounting Processing**

These requirements define the processing that is necessary for determining and updating the billing and accounting information.

S-DSS-21340	The STMGT CI shall provide data to support administrative requests for Accounting Management Data.
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S-DSS-21350            The STMGT CI shall collect Accounting Management Data as defined in Appendix A.

#### **4.4.3.9 Archive Storage Processing**

These requirements define the specifications for the storage processing.

S-DSS-21360            The STMGT CI shall use a hierarchy of disk and/or tape storage devices and associated storage media to store data.

S-DSS-21363            The STMGT CI shall provide location-transparent access to the archived data.

S-DSS-21365            The STMGT CI shall provide storage for the Data Products listed in Appendix F.

S-DSS-21366            The STMGT CI shall provide storage for the Metadata associated with the Data Products listed in Appendix F.

S-DSS-21370            The STMGT CI shall use, where appropriate, a hierarchy of disk and/or tape storage devices and associated storage media to retrieve data.

S-DSS-21380            In the event of storage device or archive media failure, the STMGT CI shall notify operations staff and provide appropriate information to include failed device name or media, failure code or reason and time/date of failure.

S-DSS-21390            The STMGT CI shall maintain a File Directory of all data files which have been archived and under its control.

S-DSS-21400            The STMGT CI shall provide operations staff a mechanism to create the File Directory.

S-DSS-21410            The STMGT CI shall provide operations staff a mechanism to append records to the File Directory.

S-DSS-21420            The STMGT CI shall provide operations staff a mechanism to display selected records in the File Directory.

S-DSS-21430            The STMGT CI shall provide operations staff a mechanism to delete records from the File Directory.

S-DSS-21440            The STMGT CI shall provide operations staff a mechanism to update records in the File Directory.

S-DSS-21450            The STMGT CI shall provide operations staff the capability to backup the contents of the File Directory.

S-DSS-21460            The STMGT CI shall provide operations staff the capability to recover the contents of the File Directory in the case of file corruption.

S-DSS-21470            The STMGT CI shall provide operations staff the capability to view/display/print contents of the File Directory.

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|-------------|---|
| S-DSS-21480 | The STMGT CI shall maintain a unique data set id for each data item in its File Directory.                          |
| S-DSS-21490 | The STMGT CI shall be capable of tracking the physical location of each data granule via use of the File Directory. |

#### **4.4.3.10 Archive Performance Requirements**

These requirements define the storage management performance requirements.

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| S-DSS-21500 | The STMGT CI shall support making stored Data Products available on physical media within 24 hours   |
| S-DSS-21510 | The STMGT CI shall be capable of providing of 200% expansion in capacity without architecture or design change.  |
| S-DSS-21520 | The STMGT CI shall be capable of processing a combined maximum number of Data Requests per hour (across ECS) from the Data Management Subsystem and/or the Client Subsystem as specified in Appendix E.                                      |
| S-DSS-21540 | The STMGT CI shall support distributing product QA data produced at the collocated Data Processing Subsystem within 1 hour from the time it is ready.  |
| S-DSS-21570 | The STMGT CI shall have the capacity to archive the total bytes of data derived in Appendix E.   |
| S-DSS-21600 | The MSFC DAAC STMGT CI shall archive original TSDIS standard products (Level 1B-3) after reprocessing for a minimum of 6 months  |
| S-DSS-21610 | The MSFC DAAC STMGT CI shall make TSDIS original standard products (Level 1B-3) eligible for deletion after 6 months   |
| S-DSS-21630 | The GSFC DAAC STMGT CI shall archive original TSDIS standard products (Level 1B-3) after reprocessing for a minimum of 6 months  |
| S-DSS-21640 | The STMGT CI shall support making archive data associated with a pre-defined ECS standard format available to the network in that format within an average of 2 minutes.   |
| S-DSS-21650 | The STMGT CI shall support making archive data associated with a pre-defined ECS standard format available to the network in a different format within an average of 5 minutes.  |
| S-DSS-21655 | The STMGT CI shall utilize media with a rated shelf life of at least 10 years as determined by National Archives and Record Administration (NARA), National Institute for Standards and Technology (NIST), NASA or an industry organization. |

#### 4.4.4 DDIST- Data Distribution Services CSCI

The Data Distribution CSCI provides the Data Server and its operations staff the capability to monitor and control the processing associated with the distribution of data. Data Distribution processing mainly consists of preparing requested data objects for distribution on specified media or via the network and subsequently delivering or allowing the delivery of data products to requesting clients. This includes the staging of data on a file system for subsequent direct access by remote programs via the WAN (e.g., via network file system access).

Part of the preparation of the data objects includes the reformatting of the data into a format requested by the user (e.g., HDF, postscript, etc.). The reformatting may also include compression, if requested and the data is not already held in the compressed form, to more efficiently utilize the distribution medium.

In addition to preparing of the data, Data Distribution will also generate the necessary packaging materials if the data is to be distributed on media and distribution metadata if the data is to be distributed via the network. The packaging materials include the packing list, showing all data objects stored on the delivery media, and the media label that relates it to the requester. The media will include, but not be limited to, CD ROM, tape of various formats, etc. This activity is also described further in the Operations Concept document.

The Data Distribution CSCI collaborates with the Storage Management CSCI to access data held on a storage resource. It also utilizes the interfaces of CSMS to perform the network dissemination.

##### 4.4.4.1 Distribution Request Processing

These requirements define the processing for the receipt and execution of requests for data distribution.

S-DSS-30160	The DDIST CI shall send a Notification to the originator of a Distribution Request in the event that the request is canceled by operations staff.
S-DSS-30163	The DDIST CI shall authenticate the User Identifier of operations staff submitting an Ingest Cancellation Request.
S-DSS-30165	The DDIST CI shall log a Distribution Request Cancellation Message whenever a Distribution Request is canceled by the operations staff.
S-DSS-30167	The DDIST CI shall log a Distribution Request Cancellation Message whenever a Distribution Request is canceled by the science user.
S-DSS-30010	The DDIST CI shall accept Electronic Distribution Requests or Media Distribution Requests.
S-DSS-30020	Distribution Requests shall have the format described in Appendix A.
S-DSS-30030	The DDIST CI shall validate each Electronic Distribution Request and verify that the format conforms to that specified in Appendix A.

S-DSS-30040	The DDIST CI shall log the following on the Distribution Activity Log whenever an Electronic Distribution Request fails validation: User Identifier, Request Identifier, Date and Time, and an explanation of the failure.
S-DSS-30045	The DDIST CI shall send Notifications to users via email in the event that the request is canceled by operations staff and the user has an active session.
S-DSS-30046	The DDIST CI shall send Notifications to the user's desktop application in the event that the request is canceled by operations staff and the user has an active session.
S-DSS-30050	The DDIST CI shall send a Notification to the source of the request if an Electronic Distribution Request fails validation.
S-DSS-30060	The DDIST CI shall validate each Media Distribution Request and verify that it conforms to the format specified in Appendix A.
S-DSS-30070	The DDIST CI shall log a Distribution Failure Message whenever a Media Distribution Request fails validation.
S-DSS-30080	The DDIST CI shall send a Notification to the source of the request if a Media Distribution Request fails validation.
S-DSS-30090	The DDIST CI shall provide the capability to prioritize requests for data based on whether the request is an Electronic Distribution Request or a Media Distribution Request.
S-DSS-30100	The DDIST CI shall provide operations staff the capability to change the Priority Information for a Distribution Request before the processing of the request has begun.
S-DSS-30110	The DDIST CI shall provide the capability for operations staff to list Distribution Requests according to whether the request is an Electronic Distribution Request or a Media Distribution Request.
S-DSS-30120	The DDIST CI shall provide the capability for operations staff to select for viewing Media Distribution Requests and Electronic Distribution Requests.
S-DSS-30130	The DDIST CI shall provide the capability for operations staff to cancel the processing of Electronic Distribution Requests prior to the start of the transmission of the data.
S-DSS-30140	The DDIST CI shall provide the capability for operations staff to cancel the data transmission initiated by the processing of an Electronic Distribution Request.
S-DSS-30150	The DDIST CI shall provide the capability for operations staff to cancel the processing of a Media Distribution Request prior to the shipment of the media.

S-DSS-30170	The DDIST CI shall respond to Status Requests from science users with a Request State indicating that the specified Distribution Request is "pending," "active," or "not found".
S-DSS-30171	The DDIST CI shall respond to Status Requests from operations staff with a Request State indicating that the specified Distribution Request is "pending," "staging", "transferring" or "not found".
S-DSS-30175	Status Requests shall have the format given in Appendix A.
S-DSS-30180	The DDIST CI shall process queued Distribution Requests in prioritized order.
S-DSS-30190	The DDIST CI shall record the cost of the shipping and handling of the media associated with each Media Distribution request.
S-DSS-30200	The DDIST CI shall record the network cost of data transmission, the User Identifier and the Request Identifier.
S-DSS-30115	The DDIST CI shall provide the capability for operations staff to list Distribution Requests according to Request Identifier and status.

#### **4.4.4.2 Distribution Billing/Accounting Processing**

These requirements define the processing that is necessary for determining and updating the billing and accounting information.

S-DSS-30210	The DDIST CI shall record the cost of CPU intensive operations performed on data to be distributed. Such operations include compression/decompression and reformatting.
S-DSS-30220	The DDIST CI shall record the cost of archive storage for data to be distributed based on distribution size.
S-DSS-30230	The DDIST CI shall provide the capability to report the estimated media utilization to the SDSRV CI.
S-DSS-30240	The DDIST CI shall provide the capability to report the actual media utilization to the SDSRV CI.

#### **4.4.4.3 Client Processing**

These requirements define the interaction between a client and the DDIST CI.

S-DSS-30250	The DDIST CI shall process Status Requests requesting the status of previously submitted Distribution Requests.
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#### 4.4.4.4 Distribution Log Processing

These requirements define the capabilities of logging and log processing that the distribution CI utilizes.

S-DSS-30260	The DDIST CI shall log the receipt of a Data Distribution Request in the Distribution Activity Log.
S-DSS-30270	The DDIST CI shall log the following to the Distribution Activity Log, for each Media Distribution Request: User Identifier, Media Identifiers, Media Specification, and the Distribution Size.
S-DSS-30280	The DDIST CI shall log the following to the Distribution Activity Log, for each Electronic Distribution Request: User Identifier, Data Destination, and the Distribution Size.
S-DSS-30285	The DDIST CI shall log all electronic transmission problems.
S-DSS-30288	The DDIST CI shall forward the Distribution Activity Log entries to the SMC.
S-DSS-30290	The DDIST CI shall provide operations staff with the capability to display the Distribution Activity Log.
S-DSS-30295	The DDIST CI shall alert operations staff when electronic transmission problems are encountered.
S-DSS-30296	The DDIST CI shall alert SMC when electronic transmission problems are encountered.
S-DSS-30300	The DDIST CI shall provide the capability to view entries according to type of distribution, by time period or by Request Identifier (i.e., source of request).
S-DSS-30305	The DDIST CI shall provide the capability to view entries according to type of distribution, by time period or by data type (i.e., source of request).
S-DSS-30310	The DDIST CI shall provide the capability to sort the Distribution Activity Log by distribution type (i.e., electronic (push/pull) and physical media type [tape, CD-ROM, etc.]).
S-DSS-30320	The DDIST CI shall record in the Distribution Activity Log the occurrence of correctable errors.
S-DSS-30330	If the DDIST CI is unable to distribute data electronically, the User Identifier, the list of data, and the reason for the failure will be logged.
S-DSS-30340	If the DDIST CI is unable to distribute data electronically, the user shall be sent a Notification.
S-DSS-30350	The DDIST CI shall provide the capability to generate reports on the distribution activity for a period specified by operations staff.

S-DSS-30355	The DDIST CI shall provide the capability to generate reports on the distribution backlog.
S-DSS-30360	The DDIST CI shall log the type of physical media that is created during distribution.
S-DSS-30370	The DDIST CI shall log the number of physical media that is created during distribution.
S-DSS-30380	The DDIST CI shall log the Media Destination and the number of data items distributed in a physical media distribution.
S-DSS-30390	The DDIST CI shall log the Data Destination and the number of data items distributed in an electronic distribution.
S-DSS-30400	The DDIST CI shall log the User Identifier for the user that originated the Data Distribution Request.

#### **4.4.4.5 Distribution Media Processing**

These requirements define the post production handling of distribution media.

S-DSS-30430	The DDIST CI shall provide the capability for the operations staff to manually enter the status of a physical media shipment. Status will be updated from "waiting for shipment" to "shipped".
S-DSS-30431	The DDIST CI shall log a physical media shipment using the following categories: pending, active, waiting for shipment.

#### **4.4.4.6 Distribution Resource Processing**

These requirements define the types of media utilized by the distribution CI as well as the capabilities that the CI will provide to manage and access the various resources.

S-DSS-30440	The DDIST CI shall provide the capability to distribute on 8mm tape.
S-DSS-30450	The DDIST CI shall provide the capability to distribute on 4mm tape.
S-DSS-30460	The DDIST CI shall provide the capability to distribute on 3480/3490 tape.
S-DSS-30470	The DDIST CI shall provide the capability to distribute on CD ROM.
S-DSS-30480	The DDIST CI shall provide the capability to distribute on 6250 tape.
S-DSS-30490	If an uncorrectable error occurs while writing to distribution media, the operation shall be aborted and a new piece of media automatically requested from operations staff.
S-DSS-30500	If the number of correctable errors exceed a system threshold for a piece of media, the DDIST CI shall abort the operation and automatically request a new piece of media from operations staff.

S-DSS-30510	Operations staff shall have the capability to specify a threshold of correctable errors for each type of distribution media.
S-DSS-30520	The DDIST CI shall provide the capability to place Data in publicly available disks for users to "pull" the data, via ftp, at their discretion.
S-DSS-30530	The DDIST CI shall provide the capability to limit access to Data in the user pull area to the science user and the operations staff.
S-DSS-30540	The DDIST CI shall monitor the percentage of space utilized in the user pull area.
S-DSS-30550	The DDIST CI shall provide a mechanism for operations staff to view/display the percentage of space utilized in the user pull area.
S-DSS-30560	The DDIST CI shall notify operations staff if the percent utilization in the user pull area exceeds a specified threshold.
S-DSS-30570	When Data is placed in the user pull area, requesting user shall be notified that the Data is available for a limited time.
S-DSS-30575	The DDIST CI shall notify operations staff when the time limit has expired for Data in the user pull area.
S-DSS-30580	The DDIST CI shall, after operator confirmation, delete expired Data from the user pull area.
S-DSS-30585	Operations staff shall be able to turn off the function of operator confirmation associated with the automatic deletion of Data in the user pull area.
S-DSS-30590	For physical media distributions, a hardcopy listing of the contents (files) of the media shall be produced.
S-DSS-30600	The DDIST CI shall provide the capability to distribute Data electronically via ftp (push).
S-DSS-30620	The DDIST CI shall provide the capability to distribute documents electronically via FAX transmissions.
S-DSS-30640	The DDIST CI shall provide the capability for operations staff to change the state (on-line vs. off-line) of a peripheral device that is used for distribution.
S-DSS-30650	The DDIST CI shall provide the capability for operations staff to display the state (on-line vs. off-line) of peripheral distribution devices.
S-DSS-30660	In the event of media failure (i.e., tape breaks), the DDIST CI shall provide the capability to restart the distribution on a new piece of media.
S-DSS-30670	If an electronic push distribution fails, DDIST CI shall make a system defined number of additional attempts before aborting the transmission and



notifying the originator of the failure. These additional attempts shall be included in the Distribution Activity Log.

- S-DSS-30680 The DDIST CI shall provide the capability for operations staff to change the system defined number of additional attempts for re-transmission.
- S-DSS-30690 For physical media distributions, the DDIST CI shall generate a physical "media label" that operations staff can apply to the media, and shall associate the individual piece of media with any other media in the distribution.
- S-DSS-30700 For physical media distributions, the DDIST CI shall generate a physical "shipping label" that operations staff can affix to the shipping container and indicates the destination of the media.
- S-DSS-30705 For physical media distributions, DDIST CI shall generate a packing list describing the data on the media.
- S-DSS-30710 The DDIST CI shall provide the capability to distribute any Data , or appropriate subset, listed in the Inventory. Note: The appropriate subset of a data item is determined by and depends on the subject data type.
- S-DSS-30720 The DDIST CI shall log all transmission failures that occur.
- S-DSS-30730 The DDIST CI shall provide the capability for operations staff to manually load media into the peripheral devices.
- S-DSS-30740 The DDIST CI shall provide the capability for operations staff to manually unload media from the peripheral devices.
- S-DSS-30750 The DDIST CI shall provide the capability for the operations staff to specify a percent utilization threshold for the user pull area above which operations staff will be notified.

#### **4.4.4.7 Distribution Interface Processing**

These requirements define the external entities that distribution will have an interface. It also describes that types of interfaces that distribution will provide.

- S-DSS-30770 The DDIST CI shall provide an applications program interface to submit Distribution Requests, obtain Request Status for Distribution Requests, and retrieve a list of Distribution Requests submitted.
- S-DSS-30780 The DDIST CI shall make appropriate use of standards for data structures and data transport as defined for use within the publications of CCSDS and ISO/OSI for distribution of TRMM data to the TSDIS .
- S-DSS-30795 For physical media distributions, the DDIST CI shall record the cost of the media to be used for accounting.

#### **4.4.4.8 Distribution Performance Requirements**

These requirements define the performance of the distribution CI.

S-DSS-30800	The DDIST CI shall support making stored products available on physical media within 24 hours.
S-DSS-30810	The DDIST CI shall be capable of distributing Data via physical media generated a rate equivalent to the daily rate data are ingested at that site.
S-DSS-30840	The DDIST CI shall support distributing product QA data produced at the collocated Data Processing Subsystem within 1 hour from the time it is ready.
S-DSS-30850	The DDIST CI shall support making archive data associated with a predefined ECS standard format available to the network in that format within an avg. of 2 minutes.
S-DSS-30860	The DDIST CI shall support making archive data associated with a predefined ECS format available to the network in a different format within an average of 5 minutes.
S-DSS-30870	The DAAC DDIST CI shall be capable of electronically distributing data to users in support of Electronic Distribution Requests at a rate equivalent to daily product volume, L1-L4.
S-DSS-30875	The DDIST CI shall be capable of providing 200% expansion in capacity without architecture or design change.
S-DSS-30890	The DDIST CI shall be capable of distributing the number of bytes of data per day derived from Appendix E to TSDIS (for the purpose of reprocessing).

#### **4.4.5 ACMHW - Access and Control Management HWCI**

##### **4.4.5.1 Performance Requirements**

These requirements define the performance specifications.

S-DSS-02000	The ACMHW CI shall be sized to support the bytes/second rates derived from Appendix E on the electronic data distribution interfaces. (Supports user push/pull electronic distribution)
S-DSS-02010	The ACMHW CI shall be sized to support the number of operations/second derived from Appendix E.
S-DSS-60930	The ACMHW CI at the GSFC DAAC shall be capable of ingesting data from TSDIS at the nominal rate specified in Tables E-2 and E-3 of Appendix E.

S-DSS-60940	The ACMHW CI at the GSFC DAAC shall be capable of ingesting data at a maximum rate that is three times the nominal rate specified in Tables E-2 and E-3 of Appendix E.
S-DSS-60950	The ACMHW CI at the GSFC DAAC shall be capable of ingesting Version 0 data at the nominal rate specified in Tables E-4 and E-5 of Appendix E.
S-DSS-60970	The ACMHW CI at the GSFC DAAC shall be capable of ingesting data at a nominal rate of TBD bytes per day from the DAO by network data transfer.
S-DSS-61010	The ACMHW CI at the LaRC DAAC shall be capable of ingesting Version 0 data by network data transfer at the nominal rate specified in Tables E-4 and E-5 of Appendix E.
S-DSS-61020	The ACMHW CI at the LaRC DAAC shall be capable of ingesting data at a nominal rate of TBD bytes per day from the DAO by network data transfer.

#### **4.4.5.2 RMA Requirements**

These requirements define reliability, maintainability and availability (RMA) specifications.

S-DSS-02020	The ACMHW CI shall be configured to support the SDPS function of local Data Requestsubmission's Availability requirement of .96000 and Mean Down Time (MDT) requirement of <4 hrs.
S-DSS-02030	The ACMHW CI shall be configured to support the SDPS function of data order submission across DAACs Availability requirement of .96000 and Mean Down Time (MDT) requirement of < 4 hrs.
S-DSS-02032	The ACMHW CI shall support the RMA Requirements specified for the ECS Program.

#### **4.4.5.3 Physical Requirements**

This section contains the physical requirements for the ACMHW HWCI for each release and DAAC site. These requirements are related to power, air conditioning, grounding, fire alarm, acoustical, physical interface, and footprint sizes. The ECS Facilities Plan (DID 302/DV1) and Individual Facility requirements (DID 303/DV1) are reference documents related to this area.

S-DSS-60010	The electrical power requirements for ACMHW CI equipment shall be in accordance with Individual Facility Requirements (DID 303/DV1) and the ECS Facilities Plan (DID 302/DV1).
S-DSS-60020	The air conditioning requirements for the ACMHW CI equipment shall be in accordance with Individual Facility Requirements (DID 303/DV1) and the ECS Facilities Plan (DID 302/DV1).

S-DSS-60030	The grounding requirements for ACMHW CI equipment shall be in accordance with Individual Facility Requirements (DID 303/DV1).
S-DSS-60040	The fire alarm requirements for ACMHW CI equipment shall be in accordance with Individual Facility Requirements (DID 303/DV1).
S-DSS-60050	The acoustical requirements for ACMHW CI equipment shall be in accordance with Individual Facilities Requirements (DID 303/DV1).
S-DSS-60060	The physical interface requirements between ACMHW CI equipment and the facility shall be in accordance with "Individual Facilities Requirements (DID 303/DV1).
S-DSS-60070	The footprint size and the physical layout of ACMHW CI equipment shall be in accordance with the Individual Facilities Requirements (DID 303/DV10 and ECS Facilities Plan (DID 302/DV1).

#### **4.4.5.4 Operating System, Utilities, and Tools**

This section contains the operating system, utilities, and tools requirements for the Science Processing HWCI for each release and DAAC site.

S-DSS-60110	The operating system for each Unix platform in the ACMHW CI shall conform to the POSIX.2 standard.
S-DSS-60120	The ACMHW CI POSIX.2 compliant platform shall have the following utilities installed at a minimum: perl, emacs, gzip, tar, imake, prof, gprof, nm.
S-DSS-60130	The ACMHW CI POSIX.2 compliant platform shall have the following POSIX.2 user Portability Utilities installed at a minimum: man, vi.
S-DSS-60140	The ACMHW CI POSIX.2 compliant platform shall have the following POSIX.2 Software Development Utilities installed at a minimum: make.
S-DSS-60150	The ACMHW CI POSIX.2 compliant platform shall have the following POSIX.2 C-Language Development Utilities installed at a minimum: lex, yacc.
S-DSS-60160	The ACMHW CI POSIX.2 compliant platform shall have the following Unix shells installed at a minimum: C shell, Bourne shell, Korn shell.
S-DSS-60170	The ACMHW CI POSIX.2 compliant platform shall have on-line documentation or printed documentation for each installed tool.
S-DSS-60180	The ACMHW CI POSIX.2 compliant platform shall have installed one or more development environment supporting the following languages: <ul style="list-style-type: none"> <li>a. C,</li> <li>b. FORTRAN-77.</li> </ul>

- S-DSS-60190 Each development environment associated with the POSIX.2 compliant platform in the ACMHW CI shall have the capability to compile and link strictly conformant POSIX-compliant source code.
- S-DSS-60195 Each development environment associated with the POSIX.2 compliant platform in the ACMHW CI shall have an interactive source level debugger for ECS supported languages.

#### **4.4.6 WKSHW - Working Storage HWCI**

##### **4.4.6.1 Performance Requirements**

- S-DSS-21700 The WKSHW CI shall be sized to temporarily store the number of bytes of data derived from Appendix E.
- S-DSS-21710 The WKSHW CI shall be sized to support a sustained I/O rate derived from Appendix E in bytes/second of data.

##### **4.4.6.2 Physical Requirements**

This section contains the physical requirements for the WKSHW HWCI for each release and DAAC site. These requirements are related to power, air conditioning, grounding, fire alarm, acoustical, physical interface, and footprint sizes. The ECS Facilities Plan (DID 302/DV1) and Individual Facility requirements (DID 303/DV1) are reference documents related to this area.

- S-DSS-70010 The electrical power requirements for WKSHW CI equipment shall be in accordance with Individual Facility Requirements (DID 303/DV1) and the ECS Facilities Plan (DID 302/DV1).
- S-DSS-70020 The air conditioning requirements for the WKSHW CI equipment shall be in accordance with Individual Facility Requirements (DID 303/DV1) and the ECS Facilities Plan (DID 302/DV1).
- S-DSS-70030 The grounding requirements for WKSHW CI equipment shall be in accordance with Individual Facility Requirements (DID 303/DV1).
- S-DSS-70040 The fire alarm requirements for WKSHW CI equipment shall be in accordance with Individual Facility Requirements (DID 303/DV1).
- S-DSS-70050 The acoustical requirements for WKSHW CI equipment shall be in accordance with Individual Facilities Requirements (DID 303/DV1).
- S-DSS-70060 The physical interface requirements between WKSHW CI equipment and the facility shall be in accordance with "Individual Facilities Requirements (DID 303/DV1).
- S-DSS-70070 The footprint size and the physical layout of WKSHW CI equipment shall be in accordance with the Individual Facilities Requirements (DID 303/DV10 and ECS Facilities Plan (DID 302/DV1).

#### **4.4.6.3 RMA Requirements**

S-DSS-70075            The WKSHW CI shall support the RMA Requirements specified for the ECS Program.

#### **4.4.7 DRPHW - Data Repository HWCI**

##### **4.4.7.1 Performance Requirements**

These requirements define the performance specifications.

S-DSS-21720            The DRPHW CI shall be sized to support a sustained I/O rate of 1x the production volume from electronic distribution, where 1x production volume is derived from table E-1, Appendix E.

S-DSS-21750            The DRPHW CI shall provide a bit error rate after correction less than 1 in  $1 \times 10^{12}$ . (This requirement may be fulfilled with a combination of hardware and software components.)

S-DSS-21760            The DRPHW CI shall utilize archive media with a manufactured shelf life of at least 10 years when stored in a controlled environment

##### **4.4.7.2 Capacity Requirements**

These requirements define the storage capacity specifications.

S-DSS-21730            The DRPHW CI shall be sized to permanently store and maintain the total number of bytes of product data derived from Appendix E.

S-DSS-21740            The DRPHW CI shall be sized to permanently store and maintain the total number of bytes of record based data derived from Appendix E.

S-DSS-21770            The DRPHW CI shall be capable of providing of 200 percent expansion in capacity without architecture or design change.

##### **4.4.7.3 RMA Requirements**

These requirements define reliability, maintainability and availability (RMA) specifications.

S-DSS-21800            The DRPHW CI shall be configured to provide a .98000/<2 hrs availability for archiving data.

S-DSS-21810            The DRPHW CI shall be configured to provide a .96000/<4 hrs availability for accepting and updating metadata.

S-DSS-21811            The DRPHW CI shall be configured to provide .993/<2 hrs availability for information searches on the ECS Directory.

S-DSS-21812            The DRPHW CI shall be configured to provide .993/<2 hrs availability for the DAR submittal function.

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|-------------|--|
| S-DSS-21813 | The DRPHW CI shall be configured to provide .96/<4 hrs availability for searches on local holdings.                              |
| S-DSS-21814 | The DRPHW CI shall be configured to provide .96/<4 hrs availability for database management and maintenance interface functions. |
| S-DSS-21815 | The DRPHW CI shall support the RMA Requirements specified for the ECS Program.   |

#### **4.4.7.4 Physical Requirements**

This section contains the physical requirements for the DRPHW HWCI for each release and DAAC site. These requirements are related to power, air conditioning, grounding, fire alarm, acoustical, physical interface, and footprint sizes. The ECS Facilities Plan (DID 302/DV1) and Individual Facility requirements (DID 303/DV1) are reference documents related to this area.

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| S-DSS-80010 | The electrical power requirements for DRPHW CI equipment shall be in accordance with Individual Facility Requirements (DID 303/DV1) and the ECS Facilities Plan (DID 302/DV1).           |
| S-DSS-80020 | The air conditioning requirements for the DRPHW CI equipment shall be in accordance with Individual Facility Requirements (DID 303/DV1) and the ECS Facilities Plan (DID 302/DV1).       |
| S-DSS-80030 | The grounding requirements for DRPHW CI equipment shall be in accordance with Individual Facility Requirements (DID 303/DV1).  |
| S-DSS-80040 | The fire alarm requirements for DRPHW CI equipment shall be in accordance with Individual Facility Requirements (DID 303/DV1).   |
| S-DSS-80050 | The acoustical requirements for DRPHW CI equipment shall be in accordance with Individual Facilities Requirements (DID 303/DV1).   |
| S-DSS-80060 | The physical interface requirements between DRPHW CI equipment and the facility shall be in accordance with "Individual Facilities Requirements (DID 303/DV1).                           |
| S-DSS-80070 | The footprint size and the physical layout of DRPHW CI equipment shall be in accordance with the Individual Facilities Requirements (DID 303/DV10 and ECS Facilities Plan (DID 302/DV1). |

#### **4.4.7.5 Operating System, Utilities, and Tools**

This section contains the operating system, utilities, and tools requirements for the Science Processing HWCI for each release and DAAC site.

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| S-DSS-80110 | The operating system for each Unix platform in the DRPHW CI shall conform to the POSIX.2 standard. |
|-------------|--|

S-DSS-80120	The DRPHW CI POSIX.2 compliant platform shall have the following utilities installed at a minimum: perl, emacs, gzip, tar, imake, prof, gprof, nm.
S-DSS-80130	The DRPHW CI POSIX.2 compliant platform shall have the following POSIX.2 user Portability Utilities installed at a minimum: man, vi.
S-DSS-80140	The DRPHW CI POSIX.2 compliant platform shall have the following POSIX.2 Software Development Utilities installed at a minimum: make.
S-DSS-80150	The DRPHW CI POSIX.2 compliant platform shall have the following POSIX.2 C-Language Development Utilities installed at a minimum: lex, yacc.
S-DSS-80160	The DRPHW CI POSIX.2 compliant platform shall have the following Unix shells installed at a minimum: C shell, Bourne shell, Korn shell.
S-DSS-80170	The DRPHW CI POSIX.2 compliant platform shall have on-line documentation or printed documentation for each installed tool.
S-DSS-80180	The DRPHW CI POSIX.2 compliant platform shall have installed one or more development environment supporting the following languages: <ul style="list-style-type: none"> <li>a. C,</li> <li>b. FORTRAN-77.</li> </ul>
S-DSS-80190	Each development environment associated with the POSIX.2 compliant platform in the DRPHW CI shall have the capability to compile and link strictly conformant POSIX-compliant source code.
S-DSS-80195	Each development environment associated with the POSIX.2 compliant platform in the DRPHW CI shall have an interactive source level debugger for ECS supported languages.

#### **4.4.8 DIPHW - Distribution & Ingest Peripheral Management HWCI**

##### **4.4.8.1 Capacity Requirements**

These requirements define the temporary storage capacity specifications.

S-DSS-30950	The DIPHW CI shall be sized to temporarily store the total number of bytes of distribution data derived from Appendix E.
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##### **4.4.8.2 Performance Requirements**

These requirements define the performance specifications.

S-DSS-30960	The DIPHW CI shall be sized to support a sustained I/O rate of 1x the production volume for media distribution, where 1x production volume is derived from table E-1, Appendix E.
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S-DSS-90300	The DIPHW CI at the GSFC DAAC shall be capable of ingesting Version 0 data from physical media agreed upon between ECS and Version 0, at the nominal rate specified in Tables E-4 and E-5 of Appendix E.
S-DSS-90310	The DIPHW CI at the MSFC DAAC shall be capable of ingesting Version 0 data from physical media agreed upon between ECS and Version 0, at the nominal rate specified in Tables E-4 and E-5 of Appendix E.
S-DSS-90320	The DIPHW CI at the LARC DAAC shall be capable of ingesting Version 0 data from physical media agreed upon between ECS and Version 0, at the nominal rate specified in Tables E-4 and E-5 of Appendix E.

#### **4.4.8.3 RMA Requirements**

These requirements define reliability, maintainability and availability (RMA) specifications.

S-DSS-31000	The DIPHW CI shall be configured to support the SDPS function of Archiving and Distributing data Availability requirement of .98000 and a Mean Down Time requirement of <2 hrs. (This applies to distributing data and ingesting hard media.)
S-DSS-31005	The DIPHW CI shall support the RMA Requirements specified for the ECS Program.

#### **4.4.8.4 Physical Requirements**

This section contains the physical requirements for the DIPHW HWCI for each release and DAAC site. These requirements are related to power, air conditioning, grounding, fire alarm, acoustical, physical interface, and footprint sizes. The ECS Facilities Plan (DID 302/DV1) and Individual Facility requirements (DID 303/DV1) are reference documents related to this area.

S-DSS-90010	The electrical power requirements for DIPHW CI equipment shall be in accordance with Individual Facility Requirements (DID 303/DV1) and the ECS Facilities Plan (DID 302/DV1).
S-DSS-90020	The air conditioning requirements for the DIPHW CI equipment shall be in accordance with Individual Facility Requirements (DID 303/DV1) and the ECS Facilities Plan (DID 302/DV1).
S-DSS-90030	The grounding requirements for DIPHW CI equipment shall be in accordance with Individual Facility Requirements (DID 303/DV1).
S-DSS-90040	The fire alarm requirements for DIPHW CI equipment shall be in accordance with Individual Facility Requirements (DID 303/DV1).
S-DSS-90050	The acoustical requirements for DIPHW CI equipment shall be in accordance with Individual Facilities Requirements (DID 303/DV1).

- S-DSS-90060      The physical interface requirements between DIPHW CI equipment and the facility shall be in accordance with "Individual Facilities Requirements (DID 303/DV1).
- S-DSS-90070      The footprint size and the physical layout of DIPHW CI equipment shall be in accordance with the Individual Facilities Requirements (DID 303/DV10 and ECS Facilities Plan (DID 302/DV1).

#### **4.4.8.5 Operating System, Utilities, and Tools**

This section contains the operating system, utilities, and tools requirements for the Science Processing HWCI for each release and DAAC site.

- S-DSS-90110      The operating system for each Unix platform in the DIPHW CI shall conform to the POSIX.2 standard.
- S-DSS-90120      The DIPHW CI POSIX.2 compliant platform shall have the following utilities installed at a minimum: perl, emacs, gzip, tar, imake, prof, gprof, nm.
- S-DSS-90130      The DIPHW CI POSIX.2 compliant platform shall have the following POSIX.2 user Portability Utilities installed at a minimum: man, vi.
- S-DSS-90140      The DIPHW CI POSIX.2 compliant platform shall have the following POSIX.2 Software Development Utilities installed at a minimum: make.
- S-DSS-90150      The DIPHW CI POSIX.2 compliant platform shall have the following POSIX.2 C-Language Development Utilities installed at a minimum: lex, yacc.
- S-DSS-90160      The DIPHW CI POSIX.2 compliant platform shall have the following Unix shells installed at a minimum: C shell, Bourne shell, Korn shell.
- S-DSS-90170      The DIPHW CI POSIX.2 compliant platform shall have on-line documentation or printed documentation for each installed tool.
- S-DSS-90180      The DIPHW CI POSIX.2 compliant platform shall have installed one or more development environment supporting the following languages:
- a.      C,
  - b.      FORTRAN-77.
- S-DSS-90190      Each development environment associated with the POSIX.2 compliant platform in the DIPHW CI shall have the capability to compile and link strictly conformant POSIX-compliant source code.
- S-DSS-90195      Each development environment associated with the POSIX.2 compliant platform in the DIPHW CI shall have an interactive source level debugger for ECS supported languages.

## 4.5 INS - Ingest Subsystem

The Ingest subsystem is responsible for the receipt of data arriving at a site and the initial physical placement of the data into the site's storage facility. A provider site within EOSDIS will normally need to ingest a multitude of data types to support the services it wishes to offer. These data may be delivered through a wide variety of interfaces (network file transfer, machine-to-machine transfer, media, hard copy etc.), each with a potentially unique interface management approach. This interface heterogeneity and the need to support extendibility and new data/interfaces as algorithms and provider functionality changes, leads to a design in which the ingest functionality is isolated from other subsystems within the segment design.

Key interfaces to the Ingest subsystem are obviously the delivery of Level 0 (L0) data and exchange of products and ancillary data between DAACs, ADCs and SCFs to facilitate processing. The various types of data can be divided into several groups. To provide an introduction for the description of the subsystem the overall characteristics of these groups are outlined below:

- **L0 Data**—The L0 data is received via EDOS from the EOS spacecraft, via SDPF from the TRMM32 platform, and via the DHF33 for Landsat-7 (L0R) data. The L0 data will be stored for up to one year in Ingest subsystem hardware resources. The SDPF and Landsat-7 interfaces are designed to provide data for ECS pick-up within a specified time window. ECS coordinates data transfer, and performs file transfers when ECS resources are available. The basic characteristics of the EDOS interface are that when all packets needed to produce each data set have been received at EDOS, delivery of the data set from the EDOS to ECS will be completed within the following 21 hours. EDOS will initiate a communications protocol through Ecom to ECS to start transfer of the files. If ECS responds that it is ready to receive files, the entire data set will be transferred to ECS. If ECS does not respond that it is ready to receive files, EDOS will periodically attempt to establish the communications session.
- **Ancillary Data**—Ancillary data includes data from sources other than the MTPE instruments used in the processing of science products (e.g., platform ancillary data, digital elevation models, meteorological forecast data, etc.). Many types of ancillary data are required to support the science processing, and are characterized in the ECS Discussion Paper, "Ancillary Data in the EOSDIS Core System," [ref: 193-00123].

The Ancillary data will be acquired from several sources and will in general require QA and in some cases pre-processing before archiving in the Data Server subsystem. Pre-processing is often required to provide an efficient form for the processing algorithm to use since the ancillary data not associated with the spacecraft (e.g., meteorological forecast data) is provided in spatial and time frames which do not match the organization of data acquired from the space borne instruments.

- **Product Data**—Products will be received from other provider sites (including DAACs) for archiving in the Data Server subsystem, for satisfying user requests, for higher level processing or for use as ancillary data for other product processing. The requirements on ECS product processing embody a high degree of inter-product dependency, requiring efficient and transparent coordination between provider sites. This degree of

interdependency is a key difference from previous ground segment processing, and adds considerable constraints on the system design.

Where product data is required as an input to product processing it may require re-processing in the same way as Ancillary data.

- **Correlative Data**—Correlative data comprises data used for calibration, validation and verification of EOSDIS science products. Similar in character to ancillary data acquired from outside the EOS space segment, these data sets will generally be archived in the Data Server subsystem in their 'as-received' format with appropriate metadata to assist in location of suitable data for specific analyses. In general, ECS will be responsible only for that correlative data that is available and held by government institutions which are not able to make their data available to EOSDIS users through the interoperability infrastructure which supports all types of EOSDIS services. This avoids the need to have all data transferred 'into' EOSDIS.
- **Metadata**—Several types of metadata will also be exchanged between sites (e.g., SCFs will provide quality information to DAACs as part of the off-line QA activity).
- **Documents**—Documents in a variety of formats will be ingested at EOSDIS sites.
- **Algorithms/User Methods**—Two types of algorithms have been identified that will require ingestion. These are:
  - **Algorithms (Science Processing Software)**—The ingestion of algorithms into the ECS is a more complex procedure than the routine ingest of some types of data. An algorithm delivery will comprise many related files containing the algorithm, test data, calibration coefficients etc.
  - **User Methods**—These are 'algorithms' provided by the user community to provide special processing on EOSDIS data which isn't supported by the standard ECS functionality. These methods may be peer reviewed within the user community and made available to the entire EOSDIS user community, or be only for the suppliers use. The methods will be delivered through the Ingest subsystem for integration into the local provider site system.
- **Administrative Data**—Many types of administrative data will be exchanged between EOSDIS provider sites, other external organizations and the MSS (e.g., data availability schedules). It is intended that a consistent structure be used for administrative data to simplify Ingest subsystem interfaces.
- **"unknown"** - It is envisaged that some data will be received at an ECS provider site that will be of unknown type or format. That data will be rejected and an error status returned. All data to be ingested by ECS must be defined by means of an appropriate interface control process.

This diversity means that while each external data interface will inherit some basic characteristics (e.g., logging of data arrival) and common service functions (e.g., advertising), there will need to be considerable specialization for each interface. While it would be desirable to try and limit the diversity, and therefore the specialization, this would significantly reduce the flexibility and

extendibility to support changes and new interfaces, which would significantly reduce the flexibility of EOSDIS to support future science investigations. However, the specialization is localized primarily in the area of data preprocessing, which is dependent on the data type of the ingested data.

#### **4.5.1 INGST- Ingest Services CSCI**

The Ingest CSCI is responsible for the receipt of data arriving at a site and the initial physical placement of data into the site's storage facility. A separate instance of the Ingest CSCI is provided for each interface serviced by the Ingest subsystem. Each instance of the Ingest CSCI has similar functionality. However, in each instance the CSCI has to deal with the characteristics of the specific interface it is managing.

Ingest processing is either data-driven or schedule-driven. For data-driven ingest, data centers either a) send data availability notices to the DAACs to indicate the availability of data or b) place data in a standard location where the data may be detected periodically by ECS. For hard media ingest, the "data availability notice" is entered by DAAC operations staff at a GUI interface. For schedule-driven ingest, data centers send data availability schedules to the DAACs to indicate the estimated date and time at which data will be available at the data center.

Depending on the interface, data may be transferred by means of a "get" or a "put". ECS "gets" data from an external data provider under Ingest CSCI control. An external data provider "puts" data into an ECS location under the data provider's control.

The Ingest CSCI performs transmission checks relevant to the transfer mechanism (e.g., incomplete files, missing files, etc.) and notify the data source of success or failure. Failure may result in a request to resend or in notification of the operations staff. The DAAC operations staff may monitor the status of active ingest processing.

The Ingest CSCI extracts some minimal metadata to allow the data to be referenced. The metadata may be extracted from information within the data file or within a file or message associated with the data, or the metadata may be derived from the delivered file reference. Some portion of the metadata may be checked for "correctness" (e.g., all required metadata parameters available, parameters within a range of values, etc.).

When the ingested data are complete (i.e., all referenced items are available), the Ingest CSCI requests insertion of the data into an appropriate Data Server.

The Ingest CSCI records the successful or unsuccessful transfer of data into the site in an ingest history log. The DAAC operations staff and SMC staff may interrogate the ingest history log.

#### 4.5.1.1 Network Ingest Request

The Network Ingest Request subsection includes the Level 4 requirements that describe the processing of receiving a request from an external interface for automated data transfer, ingest, and archive. All data transfer hand-shaking is specified.

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|-------------|--|
| S-INS-00010 | The INGST CI shall accept Network Ingest Requests to request automated electronic network ingest of a collection of Data. The collection of Data shall describe one or more Data Granules.   |
| S-INS-00020 | The INGST CI shall check the Network Ingest Request to verify that the date/time prior to which the data will remain available is a valid date/time.   |
| S-INS-00030 | The INGST CI shall authenticate the provider of a Network Ingest Request as an authorized provider of data to be ingested.   |
| S-INS-00040 | The INGST CI shall report status to the provider of a Network Ingest Request and to the Error Log indicating successful or unsuccessful authentication of the provider as authorized to submit the request.  |
| S-INS-00060 | <p>The INGST CI shall report status to the provider of a Network Ingest Request for the following:</p> <ul style="list-style-type: none"><li>a. File transfer failure;</li><li>b. File size discrepancies;</li><li>c. Invalid Data Type Identifier;</li><li>d. Missing required metadata;</li><li>e. Metadata parameters out of range;</li><li>f. Data conversion failure;</li><li>g. Failure to archive data;</li><li>h. Inability to transfer data within the specified time window;</li><li>i. Missing required request information; and</li><li>j. Successful archive of the data.</li></ul> |

Note: data is considered to be archived successfully only after ECS can guarantee data integrity or recoverability.

#### 4.5.1.2 Polling Ingest Request (Delivery Record File)

The Polling Ingest Request (Delivery Record File) subsection includes the Level 4 requirements that describe the process by which ECS polls accessible network locations for available Delivery Record files. External interfaces may transfer data to an accessible network location along with a

Delivery Record file, which describes the data. ECS periodically polls for the Delivery Record files.

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| S-INS-00070 | The INGST CI shall provide the capability to periodically check a location accessible to the ESN for the presence of a Delivery Record file describing data to be ingested. The Delivery Record file shall contain the same information as a Network Ingest Request. |
| S-INS-00080 | The INGST CI shall read a Delivery Record file describing data to be ingested at a location accessible to the ESN and submit a corresponding Network Ingest Request to be processed.   |
| S-INS-00090 | The INGST CI shall provide the capability for authorized operations staff to set the period between checking for the presence of Delivery Record files.  |

#### **4.5.1.3 Polling Ingest Request (Files)**

The Polling Ingest Request (Files) subsection includes the Level 4 requirements that describe the process by which ECS polls accessible network locations for available data files. External interfaces may transfer data to an accessible network location. ECS periodically polls for the data files.

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|-------------|--|
| S-INS-00100 | The INGST CI shall provide the capability to periodically check a location accessible to the ESN for the presence of data granule files.   |
| S-INS-00110 | The INGST CI shall submit an Polling Ingest Request after detecting the presence of data granule files in a location accessible to the ESN. The request shall contain the file location. |
| S-INS-00120 | The INGST CI shall provide the capability for authorized operations staff to set the period between checking for the presence of external data granule files.                            |

#### **4.5.1.4 Hard Media Ingest Request**

The Hard Media Ingest Request subsection includes the Level 4 requirements that describe the process by which authorized operations staff interactively request ingest of data from hard media.

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|-------------|---|
| S-INS-00130 | <p>The INGST CI shall interactively accept Hard Media Ingest Requests from operations staff for data to be ingested from hard media.</p> <p>Note: a Delivery Record file must be supplied if a Delivery Record file is not contained on each piece of hard media.</p> |
| S-INS-00140 | The INGST CI shall check the Hard Media Ingest Request to verify that the Media Type is a type supported by the facility to which the request was submitted.  |

S-INS-00150	The INGST CI shall verify that the External Data Provider specified in a Hard Media Ingest Request is an authorized provider of hard media to be ingested.
S-INS-00160	The INGST CI shall authenticate that the Hard Media Ingest Request is input by operations staff authorized to ingest hard media data.
S-INS-00165	The INGST CI shall read a Delivery Record file describing data to be ingested to determine the files to be ingested after hard media data transfer.
S-INS-00170	<p>The INGST CI shall report Hard Media Ingest Request status to the submitting operations staff for the following:</p> <ol style="list-style-type: none"> <li>Media file transfer failure;</li> <li>Invalid Data Type Identifier;</li> <li>Missing required metadata;</li> <li>Metadata parameters out of range;</li> <li>Data conversion failure;</li> <li>Failure to archive data;</li> <li>Missing file describing media data to be ingested;</li> <li>Unauthorized hard media provider;</li> <li>Unauthorized operations staff; and</li> <li>Successful archive of data.</li> </ol>

#### **4.5.1.5 Interactive Network Ingest Request**

The Interactive Network Ingest Request subsection includes the Level 4 requirements that describe the process by which authorized science users interactively request ingest of data by means of network data transfer.

S-INS-00180	The INGST CI shall interactively accept Network Ingest Requests from authorized science users for electronic network ingest of a collection of Data from a location accessible via the ESN. The collection of Data shall describe one or more Data Granules.
S-INS-00190	The INGST CI shall check the Network Ingest Request to verify that the date/time prior to which the data will remain available is a valid date/time in a Network Ingest Request entered interactively by a science user.
S-INS-00200	The INGST CI shall allow a science user to specify the list of granule files in an interactive Network Ingest Request based on a displayed list of existing files stored on magnetic disk.



S-INS-00205	The INGST CI shall determine the External Data Provider for a Network Ingest Request entered interactively by a science user.
S-INS-00207	The INGST CI shall automatically determine the data volume for each file in the list of granule files for an interactively entered Network Ingest Request.
S-INS-00208	The INGST CI shall authenticate that the interactive science user entering a Network Ingest Request is authorized to request ingest of data.
S-INS-00209	The INGST CI shall report to the Error Log an unauthorized attempt to interactively request ingest of data.
S-INS-00210	The INGST CI shall allow authorized science users to save the contents of an interactively entered Network Ingest Request in a file with a specified file name.
S-INS-00220	<p>The INGST CI shall report status to the interactive submitter of a Network Ingest Request for the following:</p> <ol style="list-style-type: none"> <li>File transfer failure;</li> <li>File size discrepancy;</li> <li>Invalid Data Type Identifier;</li> <li>Missing required metadata;</li> <li>Metadata parameters out of range;</li> <li>Data conversion failure;</li> <li>Failure to archive data;</li> <li>Inability to transfer data within the specified time window;</li> <li>Unauthorized science user;</li> <li>Missing required request information; and</li> <li>Successful archive of the data.</li> </ol>
S-INS-00221	The INGST CI shall interactively accept Document Ingest Requests from authorized science users for ingest of a single collection of document Data from a location accessible via the ESN. The collection of document Data shall describe one or more document Data Granules.
S-INS-00222	The INGST CI shall check the Document Ingest Request to verify that the date/time prior to which the data will remain available is a valid date/time in a Document Ingest Request entered interactively by a science user.

S-INS-00224	The INGST CI shall allow a science user to specify the list of document granule files in an interactive Document Ingest Request based on a displayed list of existing files stored on magnetic disk.
S-INS-00225	The INGST CI shall determine the data provider and assign the Priority Information for a Document Ingest Request entered interactively by a science user.
S-INS-00226	The INGST CI shall automatically determine the data volume for each file in the list of document granule files for an interactively entered Document Ingest Request.
S-INS-00227	The INGST CI shall authenticate that the interactive science user entering a Document Ingest Request is authorized to request ingest of data.
S-INS-00228	The INGST CI shall report to the Error Log an unauthorized attempt to interactively request ingest of document data.
S-INS-00229	The INGST CI shall allow authorized science users to save the contents of an interactively entered Document Ingest Request in a file with a specified file name.
S-INS-00230	<p>The INGST CI shall report status to the interactive submitter of a Document Ingest Request for the following:</p> <ol style="list-style-type: none"> <li>a. File transfer failure;</li> <li>b. File size discrepancy;</li> <li>c. Invalid Data Type Identifier;</li> <li>d. Missing required metadata;</li> <li>e. Metadata parameters out of range;</li> <li>f. Data conversion failure;</li> <li>g. Failure to archive data;</li> <li>h. Inability to transfer data within the specified time window;</li> <li>i. Unauthorized science user;</li> <li>j. Missing required request information; and</li> <li>k. Successful archive of the data.</li> </ol>

#### **4.5.1.6 Ingest Status**

The Ingest Status subsection includes the Level 4 requirements that describe the process by which authorized operations staff and science users interactively request status on ongoing ingest request processing.

S-INS-00235	<p>The INGST CI shall accept ingest Status Requests from science users to determine the status of:</p> <ul style="list-style-type: none"> <li>a. A specified ongoing Ingest Request, previously submitted by the science user who is requesting status and identified by the ingest Request Identifier; or</li> <li>b. All of the user's ongoing Ingest Requests.</li> </ul>
S-INS-00240	The INGST CI shall determine the User Identifier for a science user submitting an ingest Status Request.
S-INS-00250	The INGST CI shall return status on a science user's ongoing Network Ingest Requests, based on User Identifier, to the user.
S-INS-00260	The INGST CI shall provide science users the capability to display the status of the user's ongoing request processing. Displayed status shall include the External Data Provider, ingest Request Identifier, total ingest data volume, and Request State.
S-INS-00270	<p>The INGST CI shall accept ingest Status Requests from authorized operations staff to determine the status of:</p> <ul style="list-style-type: none"> <li>a. A specified ongoing Ingest Request identified by ingest Request Identifier;</li> <li>b. All ongoing Ingest Requests associated with a specified User Identifier; or</li> <li>c. All ongoing Ingest Requests.</li> </ul>
S-INS-00280	The INGST CI shall determine the User Identifier for an operations staff member submitting an ingest Status Request.
S-INS-00290	The INGST CI shall authenticate the User Identifier of operations staff requesting status on all ongoing Ingest Requests.
S-INS-00295	The INGST CI shall return an error status to the requester and log information in the Error Log if status is requested on ongoing Ingest Requests from an unauthorized requester.
S-INS-00300	The INGST CI shall return status on ongoing Ingest Requests to an authorized operations staff member.
S-INS-00310	The INGST CI shall provide authorized operations staff the capability to view the status of ongoing ingest processing. Displayed status shall include the External Data Provider, ingest Request Identifier, total ingest data volume, and Request State.

S-INS-00315            The INGST CI shall provide the capability for authorized operations staff to select status of ongoing Ingest Request processing for viewing by means of the External Data Provider.

#### **4.5.1.7 Ingest Request Processing**

The Ingest Request Processing subsection includes the Level 4 requirements that describe the process by which ingest requests are processed, including initiation of data transfer, data checking, data preprocessing, and data archiving. The subsection also describes control of ingest request processing (request cancellation, suspension, and resumption).

S-INS-00316            The INGST CI shall accept an Ingest Request from authorized applications.

Note: the Ingest Request is one of: Network Ingest Request, Polling Ingest Request, Document Ingest Request, or Hard Media Ingest Request.

S-INS-00317            The INGST CI shall authenticate the User Identifier of an application submitting an Ingest Request.

S-INS-00318            The INGST CI shall determine the Priority Information for each Ingest Request based on the External Data Provider and the requested ingest priority for the request.

S-INS-00319            The INGST CI shall add a submitted Ingest Request to a list of Ingest Requests sorted by Priority Information.

S-INS-00320            The INGST CI shall select an Ingest Request for processing based on the priorities of current requests so long as the number of requests concurrently processed is less than a threshold specified by operations staff. Requests of equal priority will be processed first-in, first-out.

S-INS-00325            The INGST CI shall determine the ingest start/stop dates and times for all ingested data.

S-INS-00330            The INGST CI shall determine the Data Type Identifier for a set of ingested files, whenever the identifier was not provided in the Ingest Request.

S-INS-00340            The INGST CI shall report status on processing of an Ingest Request to the Error Log for the following:

- a.      File transfer failure;
- b.      File size discrepancy;
- c.      Invalid Data Type Identifier;
- d.      Missing required metadata;
- e.      Metadata parameters out of range;
- f.      Metadata extraction failure;

- g. Data conversion failure;
- h. Data reformatting failure;
- i. Failure to archive data;
- j. Inability to transfer data within the specified time window;
- k. Missing required request information;
- l. Unauthorized Ingest Request submitter; and
- m. Successful archive of the data.

S-INS-00350	The INGST CI shall accept an ingest Cancellation Request from authorized operations staff to cancel an ongoing ingest request, specifying the ingest Request Identifier.
S-INS-00355	The INGST CI shall accept an ingest Suspension Request from authorized operations staff to suspend ongoing ingest request processing for a specified ingest Request Identifier, to suspend all ongoing ingest request processing from a specified External Data Provider, or to suspend all ongoing ingest request processing.
S-INS-00357	The INGST CI shall accept an ingest Resumption Request from authorized operations staff to resume ongoing ingest request processing for a specified ingest Request Identifier, to resume all ongoing ingest request processing from a specified External Data Provider, or to resume all ongoing ingest request processing.
S-INS-00360	The INGST CI shall authenticate the User Identifier of operations staff submitting an ingest Cancellation Request.
S-INS-00363	The INGST CI shall authenticate the User Identifier of operations staff submitting an ingest Suspension Request or ingest Resumption Request.
S-INS-00364	The INGST CI shall accept an ingest Cancellation Request from authorized applications to cancel an ongoing Ingest Request, specifying the Request Identifier.
S-INS-00365	The INGST CI shall accept an ingest Suspension Request from authorized applications to suspend ongoing ingest request processing for a specified Request Identifier, to suspend all ongoing ingest request processing from a specified External Data Provider, or to suspend all ongoing ingest request processing.
S-INS-00367	The INGST CI shall accept an ingest Resumption Request from authorized applications to resume ongoing ingest request processing for a specified Request Identifier, to resume all ongoing ingest request processing from a specified External Data Provider, or to resume all ongoing ingest request processing.

- S-INS-00369 The INGST CI shall authenticate the User Identifier of an application submitting an ingest Cancellation Request.
- S-INS-00370 The INGST CI shall authenticate the User Identifier of an application submitting an ingest Suspension Request or ingest Resumption Request.
- S-INS-00380 The INGST CI shall provide authorized operations staff the capability to set thresholds for:
- a. Total number of Ingest Requests to process concurrently;
  - b. Number of Ingest Requests for each External Data Provider to process concurrently;
  - c. Total volume of data to ingest concurrently;
  - d. Volume of data for each External Data Provider to ingest concurrently; and
  - e. Number of data transfer retry attempts for each external interface to ECS.
- S-INS-00390 The INGST CI shall authenticate the User Identifier of operations staff requesting to set thresholds for concurrent ingest processing.
- S-INS-00392 The INGST CI shall report status on ingest Cancellation Requests to the requesting operations staff and to the Error Log for the following:
- a. Unauthorized requester;
  - b. Invalid ingest Request Identifier; and
  - c. Unable to cancel specified Ingest Request.
- S-INS-00393 The INGST CI shall report status on ingest Suspension Requests to the requesting operations staff and to the Error Log for the following:
- a. Unauthorized requester;
  - b. Invalid ingest Request Identifier; and
  - c. Unable to suspend specified Ingest Request(s).
- S-INS-00394 The INGST CI shall report status on ingest Resumption Requests to the requesting operations staff and to the Error Log for the following:
- a. Unauthorized requester; and
  - b. Invalid ingest Request Identifier.
- S-INS-00395 The INGST CI shall report status on ingest threshold setup Requests to the requesting operations staff and to the Error Log for the following:
- a. Unauthorized requester;

- b. Invalid ingest Request Identifier; and
  - c. Unable to suspend specified Ingest Request(s).
- S-INS-00396 The INGST CI shall report status on ingest Cancellation Requests to the requesting application and to the Error Log for the following:
  - a. Unauthorized requester;
  - b. Invalid ingest Request Identifier; and
  - c. Unable to suspend specified Ingest Request(s).
- S-INS-00397 The INGST CI shall report status on ingest Suspension Requests to the requesting application and to the Error Log for the following:
  - a. Unauthorized requester;
  - b. Invalid ingest Request Identifier; and
  - c. Unable to suspend specified Ingest Request(s).
- S-INS-00398 The INGST CI shall report status on ingest Resumption Requests to the requesting application and to the Error Log for the following:
  - a. Unauthorized requester; and
  - b. Invalid ingest Request Identifier.

#### **4.5.1.8 Ingest Data Preprocessing**

The Ingest Data Preprocessing subsection includes the Level 4 requirements that describe the process by which data is prepared for insertion into an ECS Data Server.

- S-INS-00400 The INGST CI shall convert ingested data into a form accepted by the SDSRV CI/DDSRV CI, as needed.
- S-INS-00402 The INGST CI shall reformat ingested data into a form accepted by the SDSRV CI/DDSRV CI, as needed.  
  
 Note: "conversion" refers to conversions to EOS-HDF or other standard formats; "reformatting" refers to byte-swapping or other platform-dependent transformations.
- S-INS-00404 The INGST CI shall extract metadata from ingested data into a form accepted by the Science Data Server/Document Data Server, as needed.
- S\_INS-00405 The INGST CI shall append the following ingest-specific metadata to metadata corresponding to ingested data:
  - a. Ingest start date and time;
  - b. Ingest stop date and time; and

- c. Total data volume.
- S-INS-00406 The INGST CI shall check selected parameters from extracted metadata to verify:
- a. That all required metadata parameters exist;
  - b. For numeric metadata parameters limited by a range of values, that parameter values lie within the specified range;
  - c. For metadata parameters with values limited to a set of discrete values, that parameter values are listed in the specified set;
  - d. That the metadata parameter syntax is correct ; and
  - e. For metadata containing parameters describing the data size, that the data size is correct (within a specified tolerance).
- S-INS-00408 For each data granule specified in an Ingest Request the INGST CI shall determine by means of an Advertisement the appropriate SDSRV CI/DDSRV CI in which to store the data granule.
- S-INS-00409 The INGST CI shall provide the capability to request storage of a data granule by means of a Data Insert Request to the SDSRV CI/DDSRV CI associated with the type of the data granule.
- NOTE: the Data Insert Request instantiates the ingested data, including a) movement to an archive, if required to ensure data integrity; b) insertion of Inventory metadata into a data repository; and c) determination of the unique Data Granule Identifier.

#### 4.5.1.9 Ingest Data Transfer

The Ingest Data Transfer subsection includes the Level 4 requirements that describe the process by which data is transferred into ECS. Detailed requirements for media data transfer are included in the Data Server subsystem section of this document. Detailed requirements for network data transfer are included in the "CSMS Requirements Specification for the ECS Project."

- S-INS-00410 The INGST CI shall provide the capability to electronically transfer data to be ingested via the ESN into a specified ECS storage location.
- S-INS-00415 The INGST CI shall provide an interim capability to electronically transfer data to be ingested via the ESN into a specified ECS storage location for early interface testing purposes.
- S-INS-00420 The INGST CI shall provide the capability for an external application to transfer data to be ingested into a specified ECS storage location.
- S-INS-00425 The INGST CI shall provide the capability to request transfer of data from an 8mm tape.



S-INS-00430	The INGST CI shall provide the capability by means of a Working Storage Allocation Request to the Data Server to allocate storage space for data to be transferred to satisfy an ingest request.
S-INS-00440	The INGST CI shall estimate whether data may complete transfer before the date/time prior to which the data will remain available.
S-INS-00450	The INGST CI shall retry transfer of data from the SDPF n times before the ingest request is failed, where n is a number specified by operations staff.
S-INS-00455	Operations staff shall contact the SDPF, EDOS, or network operations staff to resolve data transfer problems that are not handled automatically.
S-INS-00460	The INGST CI shall determine the size of each file transferred to ECS whenever file sizes are specified in the corresponding Ingest Request.
S-INS-00470	The INGST CI shall compare the size of each file after data transfer to ECS with file sizes specified in the corresponding Ingest Request.
S-INS-00480	The INGST CI shall verify that all files specified in an Ingest Request are successfully transferred to ECS.

#### **4.5.1.10 Ingest History Log Processing**

The Ingest History Log Processing subsection includes the Level 4 requirements that describe the process by which authorized operations staff interactively view status on completed ingest requests.

S-INS-00490	<p>The INGST CI shall log the following information in an Ingest History Log for each received Ingest Request:</p> <ul style="list-style-type: none"> <li>a. Ingest start/stop dates and times;</li> <li>b. Ingest Request Identifier;</li> <li>c. External Data Provider;</li> <li>d. Final Service Request Status;</li> <li>e. Data Type Identifiers;</li> <li>f. Ingest data volume;</li> <li>g. # of data sets; and</li> <li>h. # of data files.</li> </ul>
S-INS-00500	The INGST CI shall provide operations staff the capability to view selected entries from the Ingest History Log.

- S-INS-00510      The INGST CI shall provide the capability to select Ingest History Log entries for viewing by the following parameters:
- a.      Ingest start/stop dates and times;
  - b.      External Data Provider;
  - c.      Data Type Identifier; and
  - d.      Final Service Request Status.

#### **4.5.1.11 Ingest Client Interfaces**

The Ingest Client Interfaces subsection includes the Level 4 requirements that describe the specific external interfaces supported by the Ingest subsystem.

- S-INS-00520      The INGST CI shall ingest data, provided by the SDPF, from the ESN into the LaRC DAAC, using a file transfer protocol.
- S-INS-00530      The INGST CI shall ingest data, provided by the SDPF, from physical media into the LaRC DAAC as a backup transfer mechanism.
- S-INS-00540      The INGST CI shall ingest data, provided by the SDPF, from the ESN into the MSFC DAAC using a file transfer protocol.
- S-INS-00550      The INGST CI shall ingest data, provided by the SDPF, from physical media into the MSFC DAAC as a backup transfer mechanism.
- S-INS-00560      The INGST CI shall ingest Data, provided by the TSDIS, from the ESN into the GSFC DAAC using a file transfer protocol.
- S-INS-00570      The INGST CI shall ingest Data, provided by the TSDIS, from the ESN into the MSFC DAAC using a file transfer protocol.
- S-INS-00580      The INGST CI shall ingest Data, provided by the EDOS, from the ESN into the GSFC DAAC using a file transfer protocol.
- S-INS-00590      The INGST CI shall ingest Data, provided by the EDOS, from the ESN into the LaRC DAAC using a file transfer protocol.
- S-INS-00600      The INGST CI shall ingest Data, provided by the EDOS, from physical media at the GSFC DAAC as a backup transfer mechanism.
- S-INS-00610      The INGST CI shall ingest Data, provided by the EDOS, from physical media at the LaRC DAAC as a backup transfer mechanism.
- S-INS-00620      The INGST CI shall ingest data, provided by the DAO, from the ESN into the LaRC DAAC using a file transfer protocol.
- S-INS-00630      The INGST CI shall ingest data, provided by NESDIS, from the ESN into the LaRC DAAC using a file transfer protocol.

S-INS-00640	The INGST CI shall ingest data, provided by the DAO, from the ESN into the GSFC DAAC using a file transfer protocol.
S-INS-00650	The INGST CI shall ingest data, provided by the DAO, from the ESN into the EDC DAAC using a file transfer protocol.
S-INS-00670	The INGST CI shall ingest Data, provided by an SCF, from the ESN into the MSFC DAAC using a file transfer protocol.
S-INS-00680	The INGST CI shall ingest Data, provided by an SCF, from the ESN into the LaRC DAAC using a file transfer protocol.
S-INS-00720	The INGST CI shall ingest data, provided by the EOC, from the ESN using a file transfer protocol.
S-INS-00730	The INGST CI shall ingest data, provided by the FDF, from the ESN into the GSFC DAAC using a file transfer protocol.
S-INS-00740	The INGST CI shall accept a TBD request for Repaired Orbit Data.
S-INS-00780	The INGST CI shall ingest data, received via an ESN file transfer protocol from Landsat-7, into the EDC DAAC.
S-INS-00790	The INGST CI shall ingest data, received on physical media from the ASTER GDS, into the EDC DAAC.
S-INS-00800	The INGST CI shall ingest Data, provided by Version 0, from the LaRC DAAC using a file transfer protocol.
S-INS-00810	The INGEST shall ingest Data, provided by Version 0, from the GSFC DAAC on 8mm tape.
S-INS-00830	The INGEST shall ingest Data, provided by Version 0, from the MSFC DAAC on 8mm tape.
S-INS-00840	The INGEST shall ingest data provided by Adeos II/SeaWinds.

#### **4.5.1.12 Ingest Performance Requirements**

The Ingest Performance Requirements subsection includes the Level 4 requirements that describe Ingest subsystem performance.

S-INS-00900	The INGST CI at the GSFC DAAC shall be capable of 200 percent expansion in throughput without architecture or design change.
S-INS-00910	The INGST CI at the LaRC DAAC shall be capable of 200 percent expansion in throughput without architecture or design change.
S-INS-00920	The INGST CI at the MSFC DAAC shall be capable of 200 percent expansion in throughput without architecture or design change.

- S-INS-01040      The INGST CI at the LaRC DAAC shall be capable of receiving data from the SDPF once per day within 24 hours of the last acquisition Client Session.
- S-INS-01100      The INGST CI at the MSFC DAAC shall be capable of receiving data set from the SDPF once per day within 24 hours of the last acquisition Client Session.

#### **4.5.1.12 Document Scanning/Digitizing**

The Document Scanning/Digitizing subsection includes the Level 4 requirements that describe the process by which ECS scans or digitizes hard copy media into a form that may be archived in ECS.

- S-INS-02000      The INGST CI shall interactively accept Document Scanning/Digitizing Requests from authorized operations staff for hard copy media to be ingested.
- S-INS-02010      The INGST CI shall authenticate that the Document Scanning/Digitizing Request is input by operations staff authorized to ingest hard copy media.
- S-INS-02020      The INGST CI shall verify that the External Data Provider specified in a Document Scanning/Digitizing Request is an authorized provider of hard copy media to be ingested.
- S-INS-02030      The INGST CI shall automatically determine the data volume for each scanned or digitized file resulting from an interactively entered Document Scanning/Digitizing Request.
- S-INS-02040      The INGST CI shall report to the Error Log an unauthorized attempt to interactively request ingest of hard copy media.
- S-INS-02050      The INGST CI shall report Document Scanning/Digitizing Request status to the submitting operations staff for the following:
- a.      Hard copy scanning/digitizing failure;
  - b.      Invalid Data Type Identifier;
  - c.      Missing required metadata;
  - d.      Metadata parameters out of range;
  - e.      Failure to archive data;
  - f.      Unauthorized hard copy media provider;
  - g.      Unauthorized operations staff; and
  - h.      Successful archive of data.

## **4.5.2 ICLHW - Ingest Client HWCI**

The Ingest Client HWCI (ICLHW) is the single HWCI in the Ingest subsystem and contains the I/O, processing, staging, and storage resources to support the ingest and storage of Level 0 data. This HWCI consists of 3 components: (1) client hosts, (2) working storage, and (3) L0 archive repository.

### **4.5.2.1 Functional Requirements**

This section contains the functional requirements for the Ingest Client HWCI for each release and DAAC site.

S-INS-60110	The ICLHW CI shall support the hardware resource requirements of the INST CI and its interface requirements with the operations staff.
S-INS-60120	The ICLHW CI shall have provisions for degraded modes to meet RMA requirements.
S-INS-60140	The ICLHW CI shall have a fail-soft capability to meet RMA requirements.
S-INS-60150	The ICLHW CI shall have provision for Initialization, Recovery, and an orderly shutdown.
S-INS-60160	Startup and initialization of the ICLHW CI shall be completed within 30 minutes (TBR).
S-INS-60170	Shutdown of the ICLHW CI shall be completed within 30 minutes (TBR).
S-INS-60180	The ICLHW CI shall have provision for a fault detection/ fault isolation capability without interfering with operations.
S-INS-60190	The ICLHW CI shall have a status monitoring capability.

### **4.5.2.2 Performance Requirements**

This section contains the performance requirements for the Ingest Client HWCI for each release and DAAC site.

S-INS-00870	The ICLHW CI at the GSFC DAAC shall be capable of ingesting data .for EDOS/ECOM interface testing.
S-INS-00880	The ICLHW CI at the LaRC DAAC shall be capable of ingesting data for EDOS/ECOM interface testing.
S-INS-00990	The ICLHW CI at the LaRC DAAC shall be capable of ingesting data from the SPDF at the nominal daily rate specified in Table E-3 of Appendix E.
S-INS-01000	The ICLHW CI at the LaRC DAAC shall be capable of ingesting data from the SPDF at a maximum daily rate that is three times the nominal rate specified in Table E-3 of Appendix E.

S-INS-01030	The ICLHW CI at the LaRC DAAC shall be capable of ingesting data, by network data transfer from the NESDIS, at the nominal daily rate specified in Table E-3 of Appendix E.
S-INS-01050	The ICLHW CI at the MSFC DAAC shall be capable of ingesting data from the SPDF at the nominal daily rate specified in Table E-3 of Appendix E.
S-INS-01060	The ICLHW CI at the MSFC DAAC shall be capable of ingesting data from the SPDF at a maximum daily rate that is three times the nominal rate specified in Table E-3 of Appendix E.
S-INS-01070	The ICLHW CI at the MSFC DAAC shall be capable of ingesting data from the TSDIS at the nominal daily rate specified in Table E-3 of Appendix E.
S-INS-01080	The ICLHW CI at the MSFC DAAC shall be capable of ingesting data from the TSDIS at a maximum daily rate that is three times the nominal rate specified in Table E-3 of Appendix E.
S-INS-60210	The ICLHW CI shall support TBD transactions per day, as specified for each release and corresponding DAAC sites.

#### **4.5.2.3 Reliability/Maintainability/Availability Requirements**

This section contains the Reliability/ Maintainability/ Availability (RMA) requirements for the Ingest Client HWCi for each release and DAAC site. In addition, Mean-time to Restore requirement, which is related to system recovery, is also contained in this section.

S-INS-60310	The ICLHW CI shall be capable of operating in a 24 hour per day, 7 days a week mode.
S-INS-60320	The ICLHW CI shall be configured to support the receipt of science data function's Availability (A0) requirement of .99900 and Mean Down Time (MDT) requirement of 2 hours or less.
S-INS-60330	The ICLHW CI shall be capable of supporting system maintenance without impact to normal operations.
S-INS-60340	The ICLHW CI reliability predictions shall be calculated in accordance with the parts count analysis method, Appendix A of MIL-HDBK-217F, Reliability Prediction of Electronic Equipment.
S-INS-60350	The ICLHW CI maintainability shall be predicted in accordance with MIL-HDBK-472, Maintainability Prediction, Procedure IV.

#### **4.5.2.4 Interface Requirements**

This section contains the Interface requirements for the Ingest Client HWCI for each release and DAAC site.

- |             |  |
|-------------|--|
| S-INS-60410 | The ICLHW CI shall provide maintenance interfaces to support the function of System Maintenance.         |
| S-INS-60420 | The ICLHW CI shall provide operations interfaces to support the function of System Maintenance.          |
| S-INS-60430 | The ICLHW CI platforms shall have provision for interfacing with one or more Local Area Networks (LANs). |

#### **4.5.2.5 Physical Requirements**

This section contains the physical requirements for the Ingest Client HWCI for each release and DAAC site. These requirements are related to power, air conditioning, grounding, fire alarm, acoustical, physical interface, and footprint sizes. The ECS Facilities Plan (DID 302/DV1) and Individual Facility requirements (DID 303/DV1) are reference documents related to this area.

- |             |   |
|-------------|---|
| S-INS-60510 | The electrical power requirements for ICLHW CI equipment shall be in accordance with Individual Facility Requirements (DID 303/DV1) and the ECS Facilities Plan (DID 302/DV1).          |
| S-INS-60540 | The air conditioning requirements for ICLHW CI equipment shall be in accordance with Individual Facility Requirements (DID 303/DV1) and the ECS Facilities Plan (DID 302/DV1).          |
| S-INS-60550 | The grounding requirements for ICLHW CI equipment shall be in accordance with Individual Facility Requirements (DID 303/DV1).   |
| S-INS-60560 | The fire alarm requirements for ICLHW CI equipment shall be in accordance with Individual Facility Requirements (DID 303/DV1).  |
| S-INS-60570 | The acoustical requirements for ICLHW CI equipment shall be in accordance with Individual Facilities Requirements (DID 303/DV1).  |
| S-INS-60580 | The physical interface requirements between ICLHW CI equipment and the facility shall be in accordance with Individual Facilities Requirements (DID 303/DV1).                           |
| S-INS-60590 | The footprint size and the physical layout of ICLHW CI equipment shall be in accordance with the Individual Facilities Requirements (DID 303/DV1 and ECS Facilities Plan (DID 302/DV1). |

#### 4.5.2.6 Test Requirements

This section contains the test requirements for the Ingest Client HWCI for each release and DAAC site.

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|-------------|--|
| S-INS-60610 | The following testing shall be performed on the ICLHW CI: <ul style="list-style-type: none"><li>a. Unit testing,</li><li>b. Subsystem testing,</li><li>c. Integration &amp; Testing,</li><li>d. End-to- End testing.</li></ul> |
| S-INS-60620 | Internal testing shall be performed on the ICLHW CI which includes tests of hardware functions, and integration testing with other SDPS subsystems.  |
| S-INS-60630 | Internal testing shall be performed on the ICLHW CI to verify the internal interfaces to the Data Management, Client, Data Server, Planning, and Data Processing subsystems.   |
| S-INS-60640 | Each ICLHW CI element shall be capable of supporting end-to-end test and verification activities of the EOS program including during the pre-launch, spacecraft verification, and instrument verification phases.              |
| S-INS-60650 | The ICLHW CI shall be capable of being monitored during testing.   |

#### 4.5.2.7 Hardware Configuration Item Requirements

This section contains the HWCI requirements for the Ingest Client HWCI that are specific for each HWCI component for each release and DAAC site. Data rates and storage volumes to be supported at each site may be found in Appendix E.

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| S-INS-60710 | The ICLHW CI shall contain the storage and interface resources to support the ingest functions for the TRMM mission instruments of CERES and LIS. |
| S-INS-60720 | The ICLHW CI at the GSFC DAAC shall be sized to support TBD bytes/second at the electronic data ingest interface.                                 |
| S-INS-60725 | The ICLHW CI at the LaRC DAAC shall be sized to support TBD bytes/second at the electronic data ingest interface.                                 |
| S-INS-60730 | The ICLHW CI at the MSFC DAAC shall be sized to support TBD bytes/second at the electronic data ingest interface.                                 |
| S-INS-60735 | The ICLHW CI at the GSFC DAAC shall be sized to store and maintain TBD bytes of data for a 1 year period of time.                                 |
| S-INS-60740 | The ICLHW CI at the LaRC DAAC shall be sized to store and maintain TBD bytes of data for a 1 year period of time.                                 |



S-INS-60745	The ICLHW CI at the MSFC DAAC shall be sized to store and maintain TBD bytes of data for a 1 year period of time.
S-INS-60750	The ICLHW CI at the GSFC DAAC shall be sized to temporarily store TBD bytes of ingest data.
S-INS-60755	The ICLHW CI at the LaRC DAAC shall be sized to temporarily store TBD bytes of ingest data.
S-INS-60760	The ICLHW CI at the MSFC DAAC shall be sized to temporarily store TBD bytes of ingest data.
S-INS-60765	The ICLHW CI shall have a switchover time from the primary science data receipt capability to a backup capability of 15 minutes or less.

#### **4.5.2.8 Operating System, Utilities, and Tools**

This section contains the requirements for operating system, utilities, and tools for the Ingest Client HWCI for each release and DAAC site.

S-INS-60810	The operating system for each UNIX platform in the ICLHW CI shall conform to the POSIX.2 standard.
S-INS-60820	The ICLHW CI POSIX.2 compliant platform shall have the following utilities installed at a minimum: perl, emacs, gzip, tar, imake, prof, gprof, nm.
S-INS-60830	The ICLHW CI POSIX.2 compliant platform shall have the following POSIX.2 user Portability Utilities installed at a minimum: man, vi.
S-INS-60840	The ICLHW CI POSIX.2 compliant platform shall have the following POSIX.2 Software Development Utilities installed at a minimum: make.
S-INS-60850	The ICLHW CI POSIX.2 compliant platform shall have the following POSIX.2 C-Language Development Utilities installed at a minimum: lex, yacc.
S-INS-60860	The ICLHW CI POSIX.2 compliant platform shall have the following Unix shells installed at a minimum: C shell, Bourne shell, Korn shell.
S-INS-60870	The ICLHW CI POSIX.2 compliant platform shall have on-line documentation or printed documentation for each installed tool.
S-INS-60880	The ICLHW CI POSIX.2 compliant platform shall have installed one or more development environment supporting the following languages: <ul style="list-style-type: none"> <li>a. C,</li> <li>b. FORTRAN-77.</li> </ul>

S-INS-60890	Each development environment associated with the POSIX.2 compliant platform in the ICLHW CI shall have the capability to compile and link strictly conformant POSIX-compliant source code.
S-INS-60895	Each development environment associated with the POSIX.2 compliant platform in the XYZ CI shall have an interactive source level debugger for ECS supported languages.

## 4.6 PLS - Planning Subsystem

The Planning subsystem provides the functions needed to pre-plan routine data processing, schedule ad-hoc processing, and dispatch and manage processing requests.

The Planning Subsystem supports the site operations staff in developing a Production Plan based on a locally defined strategy, reserving the resources to permit the plan to be achieved and the implementation of the plan as data (push) and production requests (pull) are received. It also allows the site operations staff to negotiate on a common basis with other provider sites and EOSDIS management (via MSS/SMC) if any change to their Production Plan causes conflict with other provider sites plans (e.g., where dependencies between processing algorithms cannot be fulfilled).

The design separates the generation and implementation of a Production Plan in this subsystem from the detailed queuing of processing within the Data Processing Subsystem. The following distinction is made:

- Production Plan—what the local site wants to achieve if data arrives according to the agreed data availability schedule until the production strategy is changed
- Processing Queue—what the site is currently doing for the next operations period to implement the plan as a result of data arrivals and user requests for processing

Thus the Production Plan implements the local site strategy with regard to the priorities it wants to apply to standard processing, reprocessing, on-demand processing, etc. Of course these priorities may be influenced by EOSDIS wide mandates; but the general aim is to provide the ability for a site manager to define a local production strategy.

The nature of the planning process will be different for routine and on-demand processing requests:

- Routine Processing—this type of request will be generated internally by Planning based on the processing strategy that the site wants to follow, or has been mandated by EOSDIS management. If the required data for the processing is already available the request will be processed according to the plan. If the data is not available the planned request will only be initiated when data arrives.
- On-Demand Processing—these requests will be generated by users through services production services advertised by the Data Server. Requests will be formulated at the Data Server and passed to Planning for inclusion in the plan.

Local policy will dictate the split of production resources to be devoted to routine requests and on-demand requests. This policy will be based on expected usage of a product and resource cost analysis for particular data collections and be implemented through a processing strategy (e.g., Processing string EDC-A will be dedicated to on-demand processing from 0800-1700 EST) and the application of priority rules (e.g., On demand processing in support of the BOREAS-2 field campaign gets highest priority between 1 May and 30 June 1999). The Planning Subsystem must support variations in policy from service provider to service provider, from data collection to data collection, and over time (e.g., as usage patterns change).

#### **4.6.1 PLANG- Production Planning CSCI**

The Planning CSCI will provide the ability to create, modify, and implement a Production Plan for a site. A Production Plan is generated by expanding Production Requests into individual Data Processing Requests with reference to Production Rules (priorities, etc.), predicted resource availability, and predicted data availability. Multiple candidate plans can be created, but only one plan is currently active at any one time. Planning implements the selected Production Plan by submitting the Data Processing Requests in the plan to the Data Processing Subsystem, or whatever resources that support authorized processing, as data becomes available. PGE execution status is recorded against the plan to assess the progress of data processing.

Production Requests are entered by operations for standard and reprocessing production. These requests are maintained in the Planning database and are included in the next candidate plan when it is generated. On-Demand Requests are accepted by Planning from the Data Server. Depending on whether On-Demand Requests meet pre-determined criteria, they may be either submitted immediately for processing queuing, or they may be added to the Planning database for inclusion in the next candidate plan.

Data Processing Requests are submitted by Planning for processing when the required input data is available. For standard processing, input data may not be available when a plan is activated. Data will be expected to arrive during the Plan time frame from EDOS or TRMM. Planning will be informed of this data availability by Subscription Notices as a result of Subscriptions manually submitted to the appropriate Data Server.

The Planning CSCI tracks the status of all Production Requests entered and all Data Processing Requests generated. Management reports are generated (either periodically or upon request) that provide information concerning the Planning workload and the status of requests processed.

The Planning CSCI may interface with the following SDPS subsystems to fulfill its responsibilities:

1. *Data Processing Subsystem*—The Planning CSCI is responsible for creating a Production Plan to be coordinated with the Data Processing Subsystem. The Production Plan information is conveyed to the Data Processing Subsystem through the use of Data Processing Request messages. For each Data Processing Request, Planning provides priority information which Processing uses to manage the execution of PGEs and the resources that a PGE requires for execution. Each Data Processing Request represents one processing job to be performed by a Data Processing Subsystem computer resource.

2. *Data Server Subsystem*—In general, Data Processing Requests are submitted by the Planning CSCI to Data Processing when the necessary input data for that Data Processing Request is determined to be available. This determination is provided by the Data Server Subsystem through two methods. Queries are submitted by Planning to determine if the necessary data already exists and is stored in a Data Server. For data anticipated to become available in the future (e.g., Level 0 data from EDOS or TRMM), Subscriptions are submitted to the appropriate Data Server which results in a Subscription Notice being provided to Planning when an instance of that data becomes available.
3. *CSMS*—CSMS services support communications with other SDPS subsystems and provides predicted processing hardware resource availability. Also, CSMS provides services for Performance, Fault, Accounting, Accountability, Configuration, and Security Management.
4. *Operations Interface*—To support the management and monitoring of the generation and implementation of Production Plans, a HMI interface is provided. This interface provides access to and control of the Planning database which drives the generation of candidate plans and allows the selection of one of these plans to become the currently active plan. It also provides the ability to monitor the implementation of the currently active plan to determine production status.

#### 4.6.1.1 Production Request Processing

This group of PLANG CI requirements relates to the receipt and handling of Production Requests for processed Data Products. Requirements included in this group concern the entry/update/cancellation of Production Requests for Standard/Reprocessing/On-Demand Products, validation of the requests, and responses returned to the originator.

S-PLS-00005	The PLANG CI shall accept priority Production Requests for the generation of specific Data Products.
S-PLS-00010	The PLANG CI shall accept Production Requests for specific Data Products with associated time windows that are to be routinely generated.
S-PLS-00020	The PLANG CI shall generate Data Processing Requests from Production Requests.
S-PLS-00040	The PLANG CI shall reject a Production Request if an invalid product identifier has been specified.
S-PLS-00050	The PLANG CI shall reject a Production Request if an unauthorized User Identifier is specified.
S-PLS-00060	The PLANG CI shall support the capability to display a response message to the operations staff, indicating the acceptance/rejection status of Production Requests and the reasons for rejection (if applicable).
S-PLS-00070	The PLANG CI shall accept Production Requests for reprocessing of Data Products from currently available input data.

S-PLS-00100	The PLANG CI shall accept Production Requests for On-Demand Data Products.
S-PLS-00110	The PLANG CI shall reject a Production Request for On-Demand Data Products if the processing completion deadline (specified in the Production Request) cannot be met.
S-PLS-00120	The PLANG CI shall validate Production Requests for On-Demand Data Products against a pre-approved list of acceptance criteria.
S-PLS-00130	The PLANG CI shall send a response message to the Data Server confirming the acceptance status of the received Production Request for On-Demand Data Products ("accepted," "rejected," "deferred") and reason for rejection of a request (if applicable).
S-PLS-00140	Upon acceptance of a Production Request for an On-Demand Data Product, the PLANG CI shall immediately forward its corresponding Data Processing Requests to the PRONG CI if predefined resource thresholds are not exceeded and if the input data is available.
S-PLS-00150	The PLANG CI shall defer On-Demand Production Requests for future plan generation consideration when these On-Demand Production Requests are estimated to exceed a predefined resource threshold.
S-PLS-00160	If a Production Request for an On-Demand Data Product exceeds a predefined resource usage threshold, the PLANG CI shall notify the operations staff that the Production Request has been deferred.
S-PLS-00170	The PLANG CI shall accept updates (modifications/cancellations) to Production Requests for On-Demand Data Products.
S-PLS-00180	The PLANG CI shall validate updates (modifications/cancellations) to existing Production Requests.
S-PLS-00190	The PLANG CI shall forward a response message to the Data Server indicating acceptance/rejection status of the updates to the Production Request for On-Demand Data Products .
S-PLS-00200	The PLANG CI shall accept updates (modifications/cancellations) to Production Requests entered by the operations staff.
S-PLS-00220	The PLANG CI shall support the display of a response message to the operations staff, indicating the acceptance/rejection status of updates to a Production Request.
S-PLS-00260	For each Production Request being processed, the PLANG CI shall interact with the appropriate instance of the SDSRV CI to determine whether the Granules needed to satisfy the request exist.

#### 4.6.1.2 Planning Data Management

This group of PLANG CI requirements relates to the storage and management of Planning internal data required by the PLANG CI to perform production planning and production management functions. These requirements identify the data that the PLANG CI needs to track and maintain, in addition to the storage/browse/update capability associated with the data.

S-PLS-00400	The PLANG CI shall maintain Product Generation Executives (PGEs) information that identifies the Science Software, the order of execution, the conditions for execution, the processing environment, and the input/output data types and locations.
S-PLS-00410	The PLANG CI shall support the capability to display (via GUI) a list of PGEs maintained in its PGE information database.
S-PLS-00420	The PLANG CI shall support the capability to browse (via GUI) the information maintained on a specific PGE.
S-PLS-00430	The PLANG CI shall support the capability to (a) allow (authorized) operations staff updates (enter/modify/delete) of PGE information in the Planning PGE information database, (b) maintain a record of updates made.
S-PLS-00440	The PLANG CI shall maintain Production Rules that define the production strategy (rules defining production priorities and preferences) to be used when preparing a Production Plan.
S-PLS-00450	The PLANG CI shall support the capability that allows the operations staff to update (enter/ modify/ delete) the Production Rules (via GUI).
S-PLS-00460	The PLANG CI shall maintain lists of Granules needed to satisfy Production Requests.
S-PLS-00470	The PLANG CI shall maintain information on the following: a. current processing status of all Production Requests received, b. current processing status of all Data Processing Requests generated, c. detected processing fault data.
S-PLS-00475	The PLANG CI shall maintain information on the following: a. all Candidate and Active Plans generated, b. current Data Availability Schedules.
S-PLS-00490	The PLANG CI shall maintain Planning system fault data using fault isolation tools provided by the LSM.
S-PLS-00500	The PLANG CI shall maintain a record of the database environment used to generate Candidate and Active Plans.

#### 4.6.1.3 Production Plan Generation

This group of PLANG CI requirements relates to the PLANG CI's capability to generate candidate plans (production planning) and activate/cancel active plans. Requirements relating to the receipt and processing of Data Availability Schedules, candidate plan generation criteria, generation of Data Processing Requests for production and test environments, and handling of Data Subscriptions/Notices are included in this group.

S-PLS-00600	The operations staff shall manually submit (to the Data Server) Data Subscriptions for the Data Availability Schedules (DAS) of SDPF and any remote ADC.
S-PLS-00610	The operations staff shall manually submit (to the Data Server) Data Subscriptions for the Data Availability Schedules (DAS) of any remote ECS sites, EDOS, any IP and any ODC.
S-PLS-00620	The PLANG CI shall receive Data Availability Schedule Notices indicating arrival of Data Availability Schedules (DAS) for SDPF and any ADC.
S-PLS-00630	The PLANG CI shall receive Data Availability Schedule Notices indicating arrival of Data Availability Schedules (DAS) for any remote ECS site, EDOS, any IP, and any ODC.
S-PLS-00640	The PLANG CI shall accept Data Availability Schedules (DAS) for SDPF and any ADCs based on the Data Availability Schedule Notices received.
S-PLS-00650	The PLANG CI shall accept Data Availability Schedules (DAS), for remote ECS sites, EDOS, IPs, and ODCs, based on the Data Availability Schedule Notices received.
S-PLS-00660	The PLANG CI shall notify the operations staff (via GUI), about the arrival of any Data Availability Schedule Notice corresponding to a DAS.
S-PLS-00670	The PLANG CI shall provide (to the operations staff) the capability to enter, via GUI, "plan creation requests" that initiate creation of Candidate Plans.
S-PLS-00680	The PLANG CI shall provide the capability to generate multiple Candidate Plans.
S-PLS-00690	The PLANG CI shall create a Candidate Plan specifying a timeline for PGE execution that will satisfy Production Requests for Standard Products.
S-PLS-00700	The PLANG CI shall create a Candidate Plan specifying a timeline for PGE execution that will satisfy Production Requests for Reprocessing and On-Demand Data Products.
S-PLS-00710	The PLANG CI shall create a Candidate Plan based on the following: <ol style="list-style-type: none"><li>1. Outstanding Production Requests, their priorities and estimated runtimes,</li></ol>

	<ol style="list-style-type: none"> <li>2. The data availability schedules for SDPF, and any remote ADC, as needed,</li> <li>3. Predicted processing resource availability information received from MSS,</li> <li>4. Planning Production Rules,</li> <li>5. Mutual PGE accessibility of shared data,</li> <li>6. Complete Notification Status messages from Data Processing.</li> </ol>
S-PLS-00720	The PLANG CI shall create a Candidate Plan based on the data availability schedules for remote ECS sites, EDOS, the IPs, and ODCs, as needed.
S-PLS-00730	The PLANG CI shall have the capability to plan algorithm and calibration coefficient test time in the test environment.
S-PLS-00740	The PLANG CI shall have the capability to schedule algorithm test Data Processing Requests that do not interfere with the operational production environment.
S-PLS-00760	The PLANG CI shall send electronic copies of the Candidate Plans and corresponding metadata to the designated local Data Server for storage and distribution.
S-PLS-00770	The PLANG CI shall provide (to the operations staff) the capability to enter, via GUI, a "Plan cancellation" request, indicating cancellation of the currently Active Plan.
S-PLS-00780	The PLANG CI shall generate Data Processing Request cancellations against previously submitted Data Processing Requests (if so directed by the operations staff), or upon activation of a new plan that no longer requires those requests.
S-PLS-00790	The PLANG CI shall send a Data Processing Request cancellation to the instance of the PRONG CI that received the original Data Processing Request.
S-PLS-00800	The PLANG CI shall provide to the operations staff the capability to enter, via GUI, a "plan activation request" that identifies which Candidate Plan is to be activated.
S-PLS-00810	The PLANG CI shall consolidate any outstanding Data Processing Requests in the current Active Plan with the Data Processing Requests in the Candidate Plan to be activated.
S-PLS-00825	The PLANG CI shall have the capability to identify all available input data (as specified in the Active Plan) that is currently awaiting quality assurance information.



S-PLS-00827	The PLANG CI shall update the quality assurance status of input data (if applicable) to reflect an expired QA timeout period if its quality assurance information has not been received within specified time periods.
S-PLS-00830	<p>The PLANG CI shall send Data Processing Requests (specified in an Active Plan) to a processing resource that can perform the processing, if the following applies:</p> <ol style="list-style-type: none"> <li>1 All required input data (including metadata) is available,</li> <li>2. Its input data has passed quality assurance (if applicable).</li> </ol>
S-PLS-00840	The PLANG CI shall send electronic copies of the Active Plan and corresponding metadata to the designated local Data Server for storage and distribution.
S-PLS-00845	The PLANG CI shall support the capability to retrieve stored plans and their corresponding metadata from the Data Server based on specific queries.
S-PLS-00850	The PLANG CI shall have the capability to generate data availability schedules (and the corresponding metadata) that reflect the Data Products expected to be generated in the Production Plan.
S-PLS-00860	The PLANG CI shall send the data availability schedules and the corresponding metadata to the designated Data Server.
S-PLS-00870	The operations staff shall manually submit Data Subscriptions for PGE input data to the appropriate Data Servers.
S-PLS-00872	The operations staff shall manually submit Data Subscriptions for L0 data to the Ingest Subsystem.
S-PLS-00875	The PLANG CI shall receive Subscription Notices indicating availability of subscribed data.
S-PLS-00880	The operations staff shall manually cancel Data Subscriptions for input data to PGEs that are no longer used, once they determine that the input data is not required by any other PGE.

#### **4.6.1.4 Production Status Monitoring**

This group of PLANG CI requirements relates to the PLANG CI's capability of monitoring the status of the Data Processing Requests returned by the PRONG CI and of updating the current active plan with this feedback.

S-PLS-01000	The PLANG CI shall receive a Data Processing Request Response message, acknowledging acceptance of the Data Processing Request forwarded to the PRONG CI.
S-PLS-01010	The PLANG CI shall receive "Complete Notification" status messages, indicating the completion status of Data Processing Requests.

S-PLS-01020	The PLANG CI shall receive responses to Data Processing Request cancellations indicating the completion status of the cancellation requests.
S-PLS-01030	The PLANG CI shall update the Active Plan with the current processing status of each Data Processing Request listed.
S-PLS-01040	The PLANG CI shall send the current processing status of Production Requests (for On-Demand Data Products) to the originating Data Server.

#### **4.6.1.5 External/Internal User Support**

This group of PLANG CI requirements cover the PLANG CI's ability to support the operations staff and user community interfaces. The requirements define the different types of graphic user interfaces needed to interact with the PLANG CI, the status/warning/faults messages displayed and the different types of reports generated.

S-PLS-01200	<p>The PLANG CI shall provide the operations staff with the capability to perform the following on-line functions, via GUI:</p> <ol style="list-style-type: none"> <li>Entry of Production Requests for Standard Products,</li> <li>Query/update/cancellation of Production Requests for Standard Products,</li> <li>Query status of Production Requests,</li> <li>Query/update of Production Rules and PGE information,</li> <li>Entry of plan creation requests,</li> <li>Entry of plan activation requests,</li> <li>Entry of plan cancellation requests,</li> <li>Query Candidate/Active Plans and corresponding status,</li> <li>Entry of requests for processing log reports/production and Data Processing Request status reports/resource utilization reports/ Planning workload status reports/ management reports.</li> </ol>
S-PLS-01210	The PLANG CI shall provide the operations staff with the capability to perform the following on-line functions, via GUI: a. Entry/query/update/cancellation of Production Requests for Reprocessing, b. Query/update/cancellation of Production Requests for On-Demand Data Products.
S-PLS-01220	The PLANG CI shall have the capability to accept a request from the operations staff for scheduling algorithm and calibration coefficient test time in the test environment.

S-PLS-01230	The PLANG CI shall support the display (via GUI) of warning messages to the operations staff indicating revised completion times if processing will not complete per original schedule.
S-PLS-01240	The PLANG CI shall support the display (via GUI) of Planning hardware and software detected faults to the operations staff.
S-PLS-01245	The PLANG CI shall provide capability to make available (for review by all affected instrument teams) information related to product generation delays and production faults.
S-PLS-01250	The PLANG CI shall record detected hardware and software errors in a Planning processing log.
S-PLS-01260	The PLANG CI shall support the capability to generate Planning processing log reports (periodically and on request) for a specified time period.
S-PLS-01270	The PLANG CI shall support the generation of Data Processing Request Status reports (upon request) that will provide Data Processing Request information based on the report generation parameters and the time period specified.
S-PLS-01280	The PLANG CI shall support the generation of Production Request Status reports (upon request) that will provide Production Request information based on the report generation parameters and the time period specified.
S-PLS-01290	The PLANG CI shall support the generation of resource utilization reports (periodically and on request).
S-PLS-01300	The PLANG CI shall support the capability to generate PLANG CI processing workload and processing turnaround time reports (periodically and on request).
S-PLS-01320	The PLANG CI shall make all reports generated available for review.

#### **4.6.1.6 System/Service Management Support**

This group of PLANG CI requirements relates to the PLANG CI's ability to provide Planning management data, detected Planning fault data and product scheduling/status data to MSS.

S-PLS-01400	The PLANG CI shall accept the fault isolation tools for the PLANG CI.
S-PLS-01410	The PLANG CI shall forward faults detected in the Planning system to MSS.
S-PLS-01420	The PLANG CI shall accept resource availability / usage information .
S-PLS-01430	The PLANG CI shall send to MSS product scheduling, processing status and data quality information.

S-PLS-01440	The PLANG CI shall collect Fault Management Data and provide it to the MSS.
S-PLS-01450	The PLANG CI shall collect Configuration Management Data and provide it to the MSS.
S-PLS-01460	The PLANG CI shall collect Accounting Management Data and provide it to the MSS.
S-PLS-01470	The PLANG CI shall collect Accountability Management Data and provide it to the MSS.
S-PLS-01480	The PLANG CI shall collect Performance Management Data and provide it to the MSS.
S-PLS-01490	The PLANG CI shall collect Security Management Data and provide it to the MSS.
S-PLS-01500	The PLANG CI shall collect Scheduling Management Data and provide it to the MSS.

#### **4.6.1.7 Design Requirements**

This group of PLANG CI requirements includes requirements relating to the PLANG CI's design and implementation.

S-PLS-01600	The PLANG CI design and implementation shall have the flexibility to accommodate Planning expansion up to a factor of 3 in its capacity with no changes to its design, and up to a factor of 10 without major changes to its design. Such expansion in capacity or capability shall be transparent to existing algorithms or product specifications.
S-PLS-01610	The PLANG CI shall be developed with configuration controlled APIs that will be capable of supporting development and integration of new algorithms developed at DAAC to support DAAC value-added production.

#### **4.6.2 PLNHW - PLNHW CI**

The Planning HWCI (PLNHW) is the primary HWCI in the Planning subsystem. The HWCI consists of 4 components: (1) Production Planning, (2) Production Management (3) DBMS Server and (4) Planning Workstation.

##### **4.6.2.1 Functional Requirements**

This section contains the functional requirements for the Planning HWCI for each release and DAAC site.

S-PLS-60010	The PLNHW CI shall support the hardware resource requirements of the PLANG CI and its interface requirements with the operations staff performing planning functions.
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S-PLS-60120	The PLNHW CI shall have a Fail-Soft capability to meet RMA requirements.
S-PLS-60150	The PLNHW CI shall have provision for Initialization, Recovery, and an orderly shutdown.
S-PLS-60160	Startup and initialization of the PLNHW CI shall be completed within 30 minutes (TBR).
S-PLS-60170	Shutdown of the PLNHW CI shall be completed within 30 minutes (TBR).
S-PLS-60180	The PLNHW CI shall have provision for a fault detection/fault isolation capability without interfering with operations.
S-PLS-60190	The PLNHW CI shall have a status monitoring capability.

#### **4.6.2.2 Performance Requirements**

This section contains the performance requirements for the Planning HWCI for each release and DAAC site.

S-PLS-60320	The PLNHW CI shall support TBD transactions per day, as specified for each release and corresponding DAAC sites (TBR).
S-PLS-60330	The PLNHW CI shall provide local storage of TBD GB (TBR).
S-PLS-60340	The PLNHW CI shall provide a DBMS storage of TBD GB (TBR).

#### **4.6.2.3 Reliability/Maintainability/Availability Requirements**

This section contains the Reliability/Maintainability/Availability (RMA) requirements for the Planning HWCI for each release and DAAC site. In addition, Mean-time to Restore requirement, which is related to system recovery, is also contained in this section.

S-PLS-60410	The PLNHW CI shall be capable of operating in a 24 hour per day, 7 days a week mode.
S-PLS-60415	The PLNHW CI shall have a design goal of having no single point of failure.
S-PLS-60420	PLNHW CI functions shall have an operational availability of TBD as a minimum and Mean Down Time (MDT) of TBD hours .
S-PLS-60430	The PLNHW CI shall have a Mean Time Between Failure (MTBF) of TBD hours for each release and corresponding DAAC sites.
S-PLS-60440	The PLNHW CI shall have a Mean Time to Restore (MTTRes) of 30 minutes (TBR).
S-PLS-60450	The PLNHW CI shall be capable of supporting system maintenance without impact to normal operations.

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| S-PLS-60510 | The PLNHW CI reliability predictions shall be calculated in accordance with the parts count analysis method, Appendix A of MIL-HDBK-217F, Reliability Prediction of Electronic Equipment. |
| S-PLS-60520 | The PLNHW CI maintainability shall be predicted in accordance with MIL-HDBK-472, Maintainability Prediction, Procedure IV.  |

#### **4.6.2.4 Interface Requirements**

This section contains the Interface requirements for the Planning HWCI for each release and DAAC site.

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| S-PLS-60610 | The PLNHW CI shall have provision for interfacing with one or more Local Area Networks (LANs).   |
| S-PLS-60620 | The PLNHW CI shall have provision for interfacing with the Data Server subsystem.                |
| S-PLS-60625 | The PLNHW CI shall have provision for interfacing with the Processing subsystem.                 |
| S-PLS-60630 | The PLNHW CI shall provide maintenance interfaces to support the function of System Maintenance. |
| S-PLS-60640 | The PLNHW CI shall provide operations interfaces to support the function of System Maintenance.  |

#### **4.6.2.5 Physical Requirements**

This section contains the physical requirements for the Planning HWCI for each release and DAAC site. These requirements are related to power, air conditioning, grounding, fire alarm, acoustical, physical interface, and footprint sizes. The ECS Facilities Plan (DID 302/DV1) and Individual Facility requirements (DID 303/DV1) are reference documents related to this area.

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| S-PLS-60810 | The electrical power requirements for PLNHW CI equipment shall be in accordance with Individual Facility Requirements (DID 303/DV1) and the ECS Facilities Plan (DID 302/DV1). |
| S-PLS-60840 | The air conditioning requirements for PLNHW CI equipment shall be in accordance with Individual Facility Requirements (DID 303/DV1) and the ECS Facilities Plan (DID 302/DV1). |
| S-PLS-60850 | The grounding requirements for PLNHW CI equipment shall be in accordance with Individual Facility Requirements (DID 303/DV1).  |
| S-PLS-60860 | The fire alarm requirements for PLNHW CI equipment shall be in accordance with Individual Facility Requirements (DID 303/DV1).   |
| S-PLS-60870 | The acoustical requirements for PLNHW CI equipment shall be in accordance with Individual Facilities Requirements (DID 303/DV1).   |

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| S-PLS-60880 | The physical interface requirements between PLNHW CI equipment and the facility shall be in accordance with Individual Facilities Requirements (DID 303/DV1).                           |
| S-PLS-60890 | The footprint size and the physical layout of PLNHW CI equipment shall be in accordance with the Individual Facilities Requirements (DID 303/DV1 and ECS Facilities Plan (DID 302/DV1). |

#### **4.6.2.6 Test Requirements**

This section contains the test requirements for the Planning HWCI for each release and DAAC site. These requirements are related to science Processing HWCI testing of units, subsystems, I&T, end-to-end , and interface testing.

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| S-PLS-61010 | The PLNHW CI shall support test activities throughout the development phase.  |
| S-PLS-61020 | The following testing shall be performed on the PLNHW CI: <ul style="list-style-type: none"> <li>a. Unit testing,</li> <li>b. Subsystem testing,</li> <li>c. Integration &amp; Testing,</li> <li>d. End-to- End testing.</li> </ul> |
| S-PLS-61040 | Internal testing shall be performed on the PLNHW CI which includes tests of hardware functions, and integration testing with other SDPS subsystems.   |
| S-PLS-61050 | Internal testing shall be performed on the PLNHW CI to verify the internal interfaces to the Data Server, and Ingest subsystems.  |
| S-PLS-61080 | The PLNHW CI shall be capable of supporting end-to-end test and verification activities of the EOS program including during the pre-launch, spacecraft verification, and instrument verification phases.                            |
| S-PLS-61150 | The PLNHW CI shall be capable of being monitored during testing.  |

#### **4.6.2.7 Operating System, Utilities, and Tools**

This section contains the operating system, utilities, and tools requirements for the Planning HWCI for each release and DAAC site.

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| S-PLS-61210 | The operating system for each Unix platform in the PLNHW CI shall conform to the POSIX.2 standard.  |
| S-PLS-61220 | Each PLNHW CI POSIX.2 compliant platform shall have the following utilities installed at a minimum: perl, emacs, gzip, tar, imake, prof, gprof, nm. |

S-PLS-61230	Each PLNHW CI POSIX.2 compliant platform shall have the following POSIX.2 user Portability Utilities installed at a minimum: man, vi.
S-PLS-61240	Each PLNHW CI platform shall have the following POSIX.2 Software Development utilities installed: make, imake.
S-PLS-61260	Each PLNHW CI POSIX.2 compliant platform shall have the following Unix shells installed at a minimum: C shell, Bourne shell, Korn shell.
S-PLS-61280	The PLNHW CI shall have provision for a dynamic analyzer to support the capability to check Science Software source code for memory leaks.
S-PLS-61350	Each PLNHW CI POSIX.2 compliant platform shall have a screen capture utility.

#### **4.6.2.8 Hardware Configuration Item Requirements**

This section contains the HWCI requirements for the Planning HWCI that are specific for each HWCI component for each release and DAAC site.

S-PLS-61530	The PLNHW CI shall contain the processing, storage, and interface resources to support the planning functions for the TRMM mission instruments of CERES and LIS.
S-PLS-61610	Each PLNHW CI workstation platform shall provide a hard media device with a capacity of TBD GB for software and system maintenance and upgrade support.

### **4.7 DPS - Data Processing Subsystem**

The main components of the Data Processing Subsystem—the science algorithms—will be provided by the science teams. The Data Processing Subsystem will provide the necessary hardware resources, as well as software for queuing, dispatching and managing the execution of these algorithms in a distributed environment of heterogeneous computing platforms. The DPS also interacts with the DSS to cause the staging and de-staging of data resources in synchronization with processing requirements.

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The Data Processing Subsystem is responsible for the management of the processing resources at a provider site. These responsibilities include the following activities:

- a. Manages, queues and executes Data Processing Requests on the processing resources at a provider site. Data Processing Requests are submitted from the Planning Subsystem;



which in turn have been triggered by arrival of data or a user request (i.e., Data Server) or internally through Planning itself (e.g., reprocessing). Data Processing Requests use PGEs to perform the processing. PGEs will result from the integration and test of delivered science algorithms [ref.: ECS White Paper 193-00118] and also user specific methods into the subsystem. They will be encapsulated in the ECS environment through the SDP Toolkit. The subsystem also supports process monitoring by the operations staff.

- b. Supports the execution of science algorithms through the SDP Toolkit. A set of tools developed to standardize and provide a common interface for each science algorithm to the EOSDIS environment.

The following documents provide guidance on the roles and responsibilities of the SDP Toolkit to support the execution of science software:

333-CD-001-002	SDP Toolkit Users Guide for the ECS Project, 11/94
193-801-SD4-001	PGS Toolkit Requirements Specification for the ECS Project, FINAL, 10/93 [AKA GSFC 423-16-02]

- c. Supports the preliminary processing of data sets, i.e., L0 and ancillary Data Products, which are required by the science algorithms, but are not in the proper format for use.
- d. Provides the Algorithm and Integration Test environment used to incorporate new science algorithms and user methods into the EOSDIS environment. The Algorithm and Integration Test environment is required when new algorithms/methods are delivered and integrated into the EOSDIS environment. It allows the user to access tools to support the Integration and Test (I&T) process through the Client Subsystem. The algorithm or method will be acquired by the system through an ingest client which will reflect local site policies on how it accepts software for integration. Once acquired, the algorithm/method and its associated data files (test, calibration, etc.) will be registered in the local site Configuration Management (CM) system as part of the archival by the Data Server Subsystem.

#### **4.7.1 PRONG- Processing CSCI**

The Processing CSCI is responsible for the initiation, managing, and monitoring of the generation of ECS Data Products. An ECS Data Product is generated through the execution of Product Generation Executives (PGEs) which are provided by the instrument teams. The Processing CSCI supports the execution of a PGE by performing the following activities :

1. Supports operations staff interfaces to monitor the Processing environment.
2. Interfaces with the Data Server to stage data required by a PGE for execution.
3. Allocates hardware resources, i.e., CPU, memory, and disk space, required by the PGE for execution.
4. Interfaces with the Data Server to free storage resources allocated to support the execution of the PGE.

A request to produce an ECS Data Product is received from Planning in the form of a Data Processing Request. A Data Processing Request contains the information (i.e., input data identification, output data identification, priority, etc.) that the Processing CSCI needs to execute the PGE. A Data Processing Request is received from Planning to use the hardware resources under the control of the Processing CSCI to support a processing job. Generally, a processing job is related to the generation of Data Products, but these jobs may include other types of processing, such as pre-processing of input data, quality assurance processing of generated Data Products, and possibly resource maintenance.

The Processing CSCI will interface with the following external actors and SDPS subsystems to fulfill its responsibilities :

1. Planning Subsystem–The Planning Subsystem is responsible for creating a Production Plan to be coordinated with the Processing CSCI. The Production Plan information is conveyed to the Processing CSCI through the use of Data Processing Request messages. For each Data Processing Request, Planning provides priority information which Processing uses to manage the execution of PGEs and the resources that a PGE requires for execution. Each Data Processing Request represents one processing job to be performed by a Data Processing Subsystem computer resource.

2. Data Server Subsystem–To support the creation of ECS Data Products, the Processing CSCI needs the capability of requesting and receiving data (Data Staging) from any of the Data Server resources which has the responsibility of maintaining the data.

Also, the Processing CSCI needs the capability of transferring data (Data Destaging) to any Data Server resource for archiving of a generated Data Product.

3. CSMS–CSMS services support communications with other SDPS subsystems and the monitoring of the Processing Hardware resources. Also, CSMS provides services for Performance, Fault, Accounting, Accountability, Configuration, and Security Management.
4. Operations Interface–To support the management and monitoring of the execution of a PGE and the creation of ECS Data Products, a HMI interface is provided. This interface provides services to support the collection of status for a Data Processing Request, the cancellation, suspension, modification of a Data Processing Request, and monitoring of the health of Data Processing Subsystem hardware resources.
5. SDP Toolkit Interface–To support PGE execution, the Processing CSCI provides information to the SDP Toolkit on the location of input Data Products and the location of where the generated output Data Products are to be maintained.

During PGE execution, the Processing CSCI monitors the execution of the PGE and informs the operations staff of current status. Status includes current processing event history (what is happening, i.e., data staging, execution). Also, monitoring will be needed to make sure that the processing activity is executing properly. Upon completion of the execution of a PGE, the Processing CSCI informs Planning and initiates the transfer of the generated Data Product (if necessary) to the Data Server.

#### **4.7.1.1 General**

S-DPS-20010	The PRONG CI shall be developed with configuration-controlled Application Programming Interfaces (APIs) to support the development and integration of DAAC value-added processing.
S-DPS-20020	The PRONG CI shall have the capability to incorporate DAAC-developed software required to support discipline specific needs.
S-DPS-20030	The PRONG CI shall be capable of operating in a 24-hour a day, 7-day week mode.
S-DPS-20040	The PRONG CI design and implementation shall have the flexibility to accommodate Processing expansion up to a factor of 3 in its capacity with no changes to the design, and up to a factor of 10 without major changes to its design. Such expansion in capacity or capability shall be transparent to existing algorithms or product specifications.

#### **4.7.1.2 DP/CSMS I/F and Support Services**

This section refers to level 4 requirements which define the interface between CSMS and the PRONG CI and defines other services which Processing requires from CSMS.

S-DPS-20100	The PRONG CI shall request information about the health and availability of a Hardware Resource by using a Systems Management Subsystem (MSS) provided Resource Management API (Application Program Interface).
S-DPS-20120	The PRONG CI shall inform the MSS using a MSS provided Fault Management API when a fault attributed to a MSS managed resource has occurred.
S-DPS-20130	The PRONG CI shall provide Fault Management data to the MSS using a MSS provided Fault Management API.
S-DPS-20140	The PRONG CI shall provide Performance Management data to the MSS using a MSS provided Performance Management API.
S-DPS-20150	The PRONG CI shall provide Accounting Management data to the MSS using a MSS provided Accounting Management API.
S-DPS-20160	The PRONG CI shall provide Accountability Management data to the MSS using a MSS provided Accountability Management API.
S-DPS-20170	The operations staff shall have the capability to modify the configuration of Data Processing subsystem Hardware resources.
S-DPS-20180	The PRONG CI shall provide an interface to support the modification of the configuration of the Data Processing subsystem Hardware resources.

S-DPS-20190	The PRONG CI shall have the capability to modify the configuration of the Data Processing subsystem Hardware resources.
S-DPS-20200	The PRONG CI shall provide Configuration Management data to the MSS using a MSS provided Configuration Management API.
S-DPS-20210	The PRONG CI shall have the capability to determine the Operational state of a Hardware or Software component.
S-DPS-20220	The operations staff shall have the capability to request a Data Processing Subsystem Resource Utilization Report from the MSS based on time span, resource classification, or operational role.
S-DPS-20230	The PRONG CI shall provide Security Management data to the MSS using a MSS provided Security Management API.
S-DPS-20240	The PRONG CI shall provide Scheduling Management data to the MSS using a MSS provided Scheduling Management API.

#### **4.7.1.3 DP Request Management**

This section defines the level 4 requirements which explain what Processing does on the receipt of a Data Processing Request and Cancel Data Processing Request from Planning.

S-DPS-20330	The PRONG CI shall accept a Cancel Data Processing Request message to delete a Data Processing Request from the Processing Queue.
S-DPS-20340	The PRONG CI shall reject a Cancel Data Processing Request if the Cancel Data Processing Request is received from an unauthorized source.
S-DPS-20400	The PRONG CI shall accept a Data Processing Request (DPR) that requests the execution of a PGE.
S-DPS-20410	The PRONG CI shall validate the information associated with the Data Processing Request.
S-DPS-20420	The PRONG CI shall reject a Data Processing Request if the Data Processing Request is received from an unauthorized source.
S-DPS-20430	The PRONG CI shall take a pre-determined error recovery action if the PGE identified in the Data Processing Request is not available for execution.
S-DPS-20440	The PRONG CI shall take a pre-determined error recovery action if the level of validation required for execution in the Data Processing Operational Environment has not been attained by the PGE version identified in the Data Processing Request .
S-DPS-20460	The PRONG CI shall take a pre-determined error recovery action if the resource which maintains the input data is not available for data staging.

S-DPS-20470	The PRONG CI shall take a pre-determined error recovery action if the resource identified as the recipient of the Output Data is not available for data destaging.
S-DPS-20480	The PRONG CI shall take a pre-determined error recovery action if the computer resource required to execute the PGE is not available.
S-DPS-20490	The PRONG CI shall queue only validated Data Processing Requests
S-DPS-20500	The Processing shall queue the Data Processing Request using the Priority Information associated with the Data Processing Request.
S-DPS-20510	The PRONG CI shall respond to the source of the Data Processing Request with a Data Processing Request Response upon the completion of validation and queue processing.
S-DPS-20520	The Data Processing Request Response shall include a reason for rejection if the Data Processing Request was rejected.

#### **4.7.1.4 Data Staging and Destaging**

This section defines the level 4 requirements which explain the interfaces between Processing and the Data Server and the activities which are needed to stage and destage data.

S-DPS-20600	The PRONG CI shall be able to determine what data required for PGE execution needs to be staged.
S-DPS-20610	The PRONG CI shall be able to determine that an ECS Data Product required for PGE execution requires staging.
S-DPS-20620	The PRONG CI shall be able to determine that the metadata associated with a ECS Data Product required for PGE execution requires staging.
S-DPS-20630	The PRONG CI shall be able to determine that an Ancillary Data Product required for PGE execution requires staging.
S-DPS-20640	The PRONG CI shall be able to determine that a Special Data Product required for PGE execution requires staging.
S-DPS-20650	The PRONG CI shall be able to determine that a Calibration Coefficient Data File required for PGE execution requires staging.
S-DPS-20660	The PRONG CI shall be able to determine that a PGE requires staging.
S-DPS-20670	The PRONG CI shall be able to determine that metadata associated with a PGE requires staging.
S-DPS-20680	The PRONG CI shall support the movement of data from one Data Processing subsystem controlled storage resource to another Data Processing subsystem controlled storage resource.

S-DPS-20690	The PRONG CI shall initiate the data staging process when the disk space required to support successful data staging is available.
S-DPS-20700	The PRONG CI shall request data staging by sending a Data Request to the SDSRV CI .
S-DPS-20710	The PRONG CI shall accept a Data Request Status message in response to the Data Request Message.
S-DPS-20720	The Data Request Status message shall inform the PRONG CI on the success or failure of data staging.
S-DPS-20730	The PRONG CI shall provide the capability to terminate the data staging process.
S-DPS-20740	The PRONG CI shall send an Data Request message to the SDSRV CI to terminate the data staging process.
S-DPS-20750	The PRONG CI shall send a Complete Notification Status message to the source of the Data Processing Request if the data staging process was not completed successfully for the Data Processing Request.
S-DPS-20760	The Complete Notification Status message shall contain error information if the message was sent as a result of the failure of data staging.
S-DPS-20770	The PRONG CI shall accept ECS Data Products from the SDSRV CI.
S-DPS-20780	The PRONG CI shall accept metadata from the SDSRV CI.
S-DPS-20790	The PRONG CI shall accept PGEs from the SDSRV CI.
S-DPS-20800	The PRONG CI shall accept Calibration Coefficient data from the SDSRV CI.
S-DPS-20810	The PRONG CI shall accept Special Data Products from the SDSRV CI.
S-DPS-20820	The PRONG CI shall accept Ancillary Data Products from the SDSRV CI.
S-DPS-20830	The PRONG CI shall send a Data Insert Request message to the SDSRV CI CI to initiate the destaging of data.
S-DPS-20840	The Data Request Status message shall inform the PRONG CI on the success or failure of data destaging.
S-DPS-20850	The PRONG CI shall destage Intermediate Data Products to the SDSRV CI.
S-DPS-20860	The PRONG CI shall destage ECS Data Products to the SDSRV CI.
S-DPS-20870	The PRONG CI shall send a Complete Notification Status message to the source of the Data Processing Request if the data destaging process was not completed successfully for the Data Processing Request.

S-DPS-20880            The Complete Notification Status message shall contain error information if the message was sent as a result of the failure of data destaging.

#### **4.7.1.5 PGE Execution Management**

This section defines the level 4 requirements which explain the PRONG CI activities needed to support the execution of a PGE.

- S-DPS-21000            The PRONG CI shall initiate execution of a PGE when the following is true:
- a.        When all input data required to execute the PGE is available on local Data Processing subsystem storage resources.
  - b.        When the computer hardware resources are available to support execution of a PGE based on the computer hardware resource information associated with the Data Processing Request.
  - c.        When the Priority Information associated with the Data Processing Request has been fulfilled.
  - d.        When the maximum disk space requirements defined for the PGE are available to support the successful execution of the PGE.
  - e.        When the maximum memory resources defined for the PGE are available to support the successful execution of the PGE.
  - f.        When the CPU resources defined for the PGE are available to support the successful execution of the PGE.
- S-DPS-21070            The PRONG CI shall allocate disk space to support the execution of a PGE.
- S-DPS-21080            The PRONG CI shall allocate memory to support the execution of a PGE.
- S-DPS-21090            The PRONG CI shall allocate CPU to support the execution of a PGE.
- S-DPS-21120            The PRONG CI shall create a Process Control File to provide information to the SDP Toolkit CI about the input data required to execute a PGE.
- S-DPS-21130            The PRONG CI shall create a Process Control File to provide information to the SDP Toolkit CI about the output data generated from the executing PGE.
- S-DPS-21140            The PRONG CI shall create a mapping of logical file handles to physical file handles in the Process Control File for the input data required to execute a PGE.
- S-DPS-21150            The PRONG CI shall create a mapping of logical file handles to physical file handles in the Process Control File for the output data generated from the executing PGE.

S-DPS-21160	The PRONG CI shall create a Status Message File to be used by the SDP Toolkit CI to collect Toolkit status and error information about the execution of a PGE.
S-DPS-21170	The PRONG CI shall create User Status Message Files to be used by the SDP Toolkit CI during PGE execution if requested through the data defining the characteristics of the PGE.
S-DPS-21180	The PRONG CI shall allocate 1 shared memory attachment to a PGE to support access to internal memory during execution.
S-DPS-21210	The PRONG CI shall monitor the use of disk space by a PGE during execution.
S-DPS-21220	The PRONG CI shall terminate the execution of a PGE if the maximum disk space requirements defined for that PGE has been exceeded by an adaptable percentage value.
S-DPS-21230	The PRONG CI shall terminate the execution of a PGE if the maximum CPU time requirements defined for that PGE has been exceeded by an adaptable percentage value.
S-DPS-21240	The PRONG CI shall terminate the execution of a PGE if the maximum memory usage requirements defined for that PGE has been exceeded by an adaptable percentage value.
S-DPS-21320	The PRONG CI shall use a SDP Toolkit API to associate Processing-Specific Metadata with each Granule of a generated Data Product.
S-DPS-21330	The PRONG CI shall provide Processing-Specific Metadata to the SDP Toolkit to be associated with each Granule of a generated Data Product.
S-DPS-21460	The PRONG CI shall use a SDP Toolkit API to associate Q/A-Specific Metadata with each Granule of a Data Product.
S-DPS-21490	The PRONG CI shall record the Q/A-Specific Metadata of each input Data Product as part of the Q/A-Specific Metadata of the Granule of a Data Product.
S-DPS-21500	The PRONG CI shall use algorithms provided by the scientists to perform automated QA on generated Data Products.
S-DPS-21510	The PRONG CI shall support the capability to update Q/A metadata as required by the execution of a PGE performing automated Q/A.
S-DPS-21520	The PRONG CI shall coordinate the deletion of the outputs of a PGE which were temporarily stored in the SDSRV CI.
S-DPS-21530	The PRONG CI shall assign a unique Granule Identifier to each Granule of a generated Data Product.



S-DPS-21540	The PRONG CI shall destage all output data generated by a PGE to the SDSRV CI. (SEE Data Staging and Destaging Reqs for more details).
S-DPS-21550	The PRONG CI shall not delete the output data generated by a PGE until the Data Request Status message is received from the SDSRV CI indicating that the output data was successfully copied to the SDSRV CI resources.
S-DPS-21560	If the resource fails during the execution of a PGE, the PRONG CI shall be capable of initiating the execution of the PGE without having to regenerate that PGE's input data.
S-DPS-21570	If a PGE fails abnormally during execution, the PRONG CI shall be capable of initiating the execution of the PGE without having to regenerate that PGE's input data.
S-DPS-21580	The PRONG CI shall send a Complete Notification Status message to the source of the Data Processing Request at the completion of PGE execution if the execution was terminated by the PRONG CI or the outputs of the PGE did not require destaging.
S-DPS-21590	Upon the completion of destaging, the PRONG CI shall send a Complete Notification Status message to the source of the Data Processing Request.

#### **4.7.1.6 Processing HMI and Operations**

This section defines the level 4 requirements which were created to explain the PRONG CI role in HMI and Operation staff activities.

S-DPS-21700	The operations staff shall have the capability of terminating the data staging process for a Data Processing Request.
S-DPS-21710	The operations staff shall have the capability of terminating the data destaging process for a Data Processing Request.
S-DPS-21720	The operations staff shall have the capability of canceling the processing of a Data Processing Request.
S-DPS-21730	The operations staff shall have the capability to suspend the processing of a Data Processing Request.
S-DPS-21740	The operations staff shall have the capability to resume suspended processing of a Data Processing Request.
S-DPS-21750	The operations staff shall have the capability of modifying the information associated with the Data Processing Request.
S-DPS-21760	The operations staff shall have the capability of viewing the Processing Queues.
S-DPS-21770	The operations staff shall have the capability of requesting the status of a Data Processing Request.

S-DPS-21780	The operations staff shall have the capability of reporting resource management information.
S-DPS-21790	The operations staff shall have the capability of viewing a Data Product.
S-DPS-21800	The operations staff shall have the capability of viewing the algorithms used to generate a Data Product.
S-DPS-21810	The operations staff shall have the capability of viewing the ECS Data Products used to generate a Data Product. .
S-DPS-21820	The operations staff shall have the capability of viewing the Calibration Coefficient Data used to generate a Data Product.
S-DPS-21830	The operations staff shall have the capability of viewing the Ancillary Data Products used to generate a Data Product.
S-DPS-21840	The operations staff shall have the capability of viewing the Status Information files associated with the generated Data Product.
S-DPS-21850	The operations staff shall have the capability of viewing all metadata associated with the generation of a Data Product.
S-DPS-21860	The PRONG CI HMI Functions shall be accessible via an API (Application Program Interface).
S-DPS-21880	The PRONG CI shall provide a User Interface to authorized users.
S-DPS-21890	The PRONG CI shall provide a Processing Queue Display as a visual display of the Processing Queues.
S-DPS-21900	The PRONG CI shall update the Processing Queue Display information when the Processing State of a queued Data Processing Request is modified.
S-DPS-21910	The PRONG CI shall update the Processing Queue Display information with an alert message when a fault has occurred during the queue processing of a Data Processing Request.
S-DPS-21920	The PRONG CI shall update the Processing Queue Display information with an alert message when a fault has occurred during the data staging process.
S-DPS-21930	The PRONG CI shall update the Processing Queue Display information with an alert message when a fault has occurred during the execution of a PGE.
S-DPS-21940	The PRONG CI shall update the Processing Queue Display information with an alert message when a fault has occurred during the data destaging process.

S-DPS-21950	The PRONG CI shall log all alert messages which are used to update the Processing Queue display information.
S-DPS-21960	The PRONG CI shall provide a user interface to cancel the processing of a Data Processing Request.
S-DPS-21970	The PRONG CI shall provide a user interface to modify the Priority Information associated with a Data Processing Request.
S-DPS-21980	The PRONG CI shall provide a user interface to modify the information associated with a Data Processing Request.
S-DPS-21990	The PRONG CI shall provide a user interface to suspend the processing of a Data Processing Request.
S-DPS-22000	The PRONG CI shall provide a user interface to resume suspended processing of a Data Processing Request.
S-DPS-22010	The PRONG CI shall provide a user interface to view the data associated with the Data Processing Request.
S-DPS-22020	The PRONG CI shall provide a user interface to support the manual Q/A of Data Products.
S-DPS-22030	The PRONG CI shall provide access to data visualization tools to support the manual Q/A of Data Products.
S-DPS-22040	The PRONG CI shall provide a user interface to support the update of the Q/A metadata of a Data Product.
S-DPS-22050	The operations staff shall provide an interface to support the visual display of a Data Product.
S-DPS-22060	The PRONG CI shall provide an interface to support the visual display of the algorithms used to generate a Data Product.
S-DPS-22070	The PRONG CI shall provide an interface to support the visual display of the ECS Data Products used to generate a Data Product.
S-DPS-22080	The PRONG CI shall provide an interface to support the visual display of the Calibration Coefficient Data used to generate a Data Product.
S-DPS-22090	The PRONG CI shall provide an interface to support the visual display of the Ancillary Data Products used to generate a Data Product.
S-DPS-22100	The PRONG CI shall provide an interface to support the visual display of the Status Information files associated with the generated Data Product.
S-DPS-22110	The PRONG CI shall provide an interface to support the visual display of all metadata associated with the generation of a Data Product.

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| S-DPS-22120 | The PRONG CI shall support a capability to alert the operations staff of a Data Product which is being stored temporarily in the Data Server. |
| S-DPS-22130 | The PRONG CI shall support a capability to alert the operations staff of a Data Product which requires quality assurance activities.          |

#### **4.7.1.7 Data Processing Request Status**

This section defines the level 4 requirements which explain how status information about a Data Processing Request and a PGE is obtained from the PRONG CI.

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| S-DPS-22200 | The PRONG CI shall accept a Processing Information Request to request the status of a Data Processing Request.  |
| S-DPS-22210 | The PRONG CI shall have the capability to provide status for a Data Processing Request.   |
| S-DPS-22220 | The PRONG CI shall provide current DPR Processing State data as part of the status information of a Data Processing Request.  |
| S-DPS-22230 | The PRONG CI shall provide current queue position as part of the status information of a Data Processing Request.   |
| S-DPS-22240 | The PRONG CI shall provide status information for the PGE associated with the Data Processing Request if the PGE is currently executing.  |
| S-DPS-22250 | The PRONG CI shall have the capability of receiving the Status Information File of an executing PGE from the Data Processing Subsystem resource executing the PGE.                              |
| S-DPS-22260 | The PRONG CI shall use the TBD message to send the Status Information File of an executing PGE associated with the Data Processing Request to the source of the Processing Information Request. |

#### **4.7.1.8 Data Processing Request Modification**

This section defines the level 4 requirements which explain how a Data Processing Request is manipulated by operations staff.

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|-------------|--|
| S-DPS-22400 | The PRONG CI shall accept Operations Commands to suspend, resume, or cancel the processing of a Data Processing Request. |
| S-DPS-22410 | The PRONG CI shall accept an Operations Command to modify a Data Processing Request.                                     |
| S-DPS-22470 | The PRONG CI shall update the DPR Processing State to cancel when the Operation Command specifies cancellation.          |
| S-DPS-22480 | The PRONG CI shall terminate data staging if in progress when the Data Processing Request is canceled.                   |

S-DPS-22490	The PRONG CI shall deallocate the memory which was allocated to the executing PGE associated with the canceled Data Processing Request.
S-DPS-22500	The PRONG CI shall deallocate the disk storage which was allocated to the executing PGE associated with the canceled Data Processing Request.
S-DPS-22510	The PRONG CI shall deallocate the CPU which was allocated to the executing PGE associated with the canceled Data Processing Request.
S-DPS-22520	The PRONG CI shall terminate the execution of the PGE if in progress when the Data Processing Request is canceled.
S-DPS-22530	The PRONG CI shall terminate data destaging if in progress when the Data Processing is canceled.
S-DPS-22540	The PRONG CI shall send a Complete Notification Status message to the source of the Data Processing Request when the Data Processing Request is canceled.
S-DPS-22560	The PRONG CI shall update the Processing State to suspend when the Operation Command specifies suspension.
S-DPS-22590	The PRONG CI shall not perform any further processing on a Data Processing Request which is suspended.
S-DPS-22600	The PRONG CI shall reject the Operation Command which specified a resume if the Data Processing Request was not suspended.
S-DPS-22610	The PRONG CI shall update the Processing State to the previous Processing State before the suspension when the Operation Command is used to resume processing for the Data Processing Request.
S-DPS-22620	The PRONG CI shall update the Priority Information associated with the Data Processing Request with the Priority Information contained in the Operation Command which specifies modify.
S-DPS-22630	The PRONG CI shall perform queue processing for a Data Processing Request which has updated Priority Information.

#### **4.7.2 SDPTK - SDP Toolkit CSCI**

The requirements for the SDP Toolkit CSCI are contained in "PGS Toolkit Requirements Specification for the ECS Project" (193-801-SD4-001).

#### **4.7.3 DPREP - Data Preprocessing CSCI**

Data Preprocessing can be defined as preliminary processing or application of operations on a data set which do not alter or modify its scientific content. Preprocessing includes changes to the format of a data set by reordering the lower level byte structure, reorganization of a data set (ordering data items within and between physical files), preparing additional metadata based on

lower level metadata, etc. There is a clear need for preprocessing. Data coming from various sources will be in numerous formats, containing a variety of metadata information that may or may not be suitable during certain stages of data handling. Due to a large number of potentially heterogeneous data sets, it is unlikely that they will be acceptable to services within ECS in their original form. As data move within the system, these incompatibilities can create obstacles to the smooth and efficient processing of data. The Preprocessing functions act on these data, and by introducing consistency make product generation seamless. It is important to distinguish Preprocessing as a logical group of processing functions and the Preprocessing CSCI that contains some of these functions.

The data that need preprocessing are:

- Attitude data contained in the spacecraft ancillary packet within Level Zero (L0) data from the Sensor Data Processing Facility (SDPF) for the Tropical Rainfall Measuring Mission (TRMM).
- Orbit/Attitude (O/A) data contained in the spacecraft ancillary packet within L0 data from EOS Data and Operations Systems (EDOS) for EOS-AM.
- L0 Data Header received from EDOS for EOS-AM.
- Repaired orbit data generated by the Flight Dynamics Facility (FDF) for EOS-AM as a replacement for defective onboard orbit data. For TRMM, the definitive orbit is FDF-generated but comes via SDPF.

The major functions that will be performed by DPREP CSCI are:

- Reformat all FDF ephemeris data sets to Hierarchical Data Format with EOS extensions (HDF-EOS) format.
- Prepare additional metadata required by the Science Data Processing (SDP) Toolkit. The Preprocessing functions will derive any additional metadata from existing metadata to provide to the SDP Toolkit.
- Provide the SDP Toolkit L0 header and O/A data in a compatible format.
- Extract additional metadata (in addition to metadata extraction at ingest) to support services on certain ancillary data sets as necessary.

The scope of extent of Preprocessing will change based on the resolution of some L3 requirements. For example, there are some outstanding issues that need to be resolved with the FDF with regard to repair/refine of attitude data. All Preprocessing functionalities have been collected under this CSCI. However, results of our analyses show that Preprocessing can actually be handled by distributing across other CSCIs. Therefore, these functions can be physically located in any subsystem. Preprocessing will be done in the subsystem most appropriate for that function. The current ECS architecture provides flexibility to distribute the Preprocessing functions across multiple subsystems. Preprocessing could be accomplished by the use of Ingest services, or by the use of manipulation functions available in the Data Server, or during staging for processing; whichever makes the most sense. If it is in the Ingest, the Preprocessing functions will be data driven, i.e., data will be preprocessed as it arrives. The Preprocessing functions in the Data Server and Processing subsystems will be event driven controlled by the Planning

subsystem. The Preprocessing transformations translate data to the most desirable and efficient storage or processing form. The Preprocessing software, if algorithm specific, will be provided by the algorithm team that requests a data transformation.

#### **4.7.3.1 Accept TRMM Orbit Data for Preprocessing**

Orbit data come from two sources: (a) FDF-generated (definitive) via SDPF, and (b) contained in the spacecraft ancillary data.

S-DPS-30010            The DPREP CI shall accept binary format of FDF-generated Definitive Orbit Data (EPHEM) for TRMM preprocessing.

#### **4.7.3.2 Accept EOS-AM Orbit Data for Preprocessing**

Orbit data come from two sources: (a) FDF-generated (definitive), and (b) contained in the spacecraft ancillary data.

S-DPS-30100            The DPREP CI shall accept CCSDS-formatted EOS-AM spacecraft Ancillary Data containing onboard orbit data for preprocessing.

S-DPS-30110            The DPREP CI shall accept ASCII/binary format of FDF-generated Definitive Orbit Data for EOS-AM preprocessing.

#### **4.7.3.3 Accept Repaired Orbit Data**

FDF monitors the quality of onboard orbit data. If there is a major anomaly, FDF provides repaired orbit data. Repaired orbit data is definitive orbit data which is FDF-repaired replacement for defective onboard orbit data. There are some outstanding cost and policy issues regarding refinement of orbit data which needs resolution.

S-DPS-30210            The DPREP CI shall accept FDF Repaired Orbit Data in ASCII/binary format for EOS-AM preprocessing.

#### **4.7.3.4 Quality Check of Orbit Data**

The spikes/dropouts in the onboard orbit data are detected and flagged by the DPREP CI. Ingest CI will be notified if the dropouts are excessive to get repaired orbit data from the FDF.

S-DPS-30300            The DPREP CI shall detect and flag (by updating metadata) spikes/dropouts in the onboard orbit data contained in the EOS-AM spacecraft Ancillary Data using FDF-provided spacecraft specifications.

S-DPS-30310            The DPREP CI shall flag (by updating metadata) bad orbit data contained in the EOS-AM spacecraft Ancillary Data using TBD spacecraft specifications.

S-DPS-30320            The DPREP CI shall notify INGEST CI when dropouts in the onboard orbit data contained in the spacecraft Ancillary Data exceed TBD threshold.

#### **4.7.3.5 Accept TRMM and EOS-AM Attitude Data for Preprocessing**

Onboard attitude data are part of TRMM and EOS-AM spacecraft ancillary data.

S-DPS-30400        The DPREP CI shall accept CCSDS-formatted TRMM spacecraft Ancillary Data containing Onboard Attitude Data for preprocessing.

S-DPS-30410        The DPREP CI shall accept CCSDS-formatted EOS-AM spacecraft Ancillary Data containing Onboard Attitude Data for preprocessing.

#### **4.7.3.6 Quality Check of Attitude Data**

The spikes/dropouts in the onboard attitude data are detected and flagged by the DPREP CI.

S-DPS-30600        The DPREP CI shall detect and flag (by updating metadata) spikes/dropouts in the Onboard Attitude Data contained in the EOS-AM spacecraft Ancillary Data using FDF-provided spacecraft specifications.

S-DPS-30610        The DPREP CI shall flag (by updating metadata) bad Attitude Data contained in the EOS-AM spacecraft Ancillary Data using TBD spacecraft specifications.

#### **4.7.3.7 Provide SDP Toolkit Access to Ephemeris Data**

The SDP Toolkit requires an uniform interface for providing access to ephemeris data. The DPREP CI provides some minimum information to the SDP Toolkit in the form of additional metadata and/or compatible data format.

S-DPS-30700        The DPREP CI shall provide to the SDP Toolkit, at a minimum, the following metadata with the ephemeris data files for TRMM processing:

- a.        Time range,
- b.        Orbit number range,
- c.        Platform.

S-DPS-30710        The DPREP CI shall provide to the SDP Toolkit, at a minimum, the following metadata with the ephemeris data files for EOS-AM processing:

- a.        Time range,
- b.        Orbit number range,
- c.        Platform.

S-DPS-30720        The DPREP CI shall provide, at a minimum, the following ephemeris data files to the SDP Toolkit for TRMM processing:

- a.        Platform position velocity vectors
- b.        Platform attitude/attitude rate data (expressed as Euler angles in radians and radians/s, respectively)



- S-DPS-30730      The DPREP CI shall provide, at a minimum, the following ephemeris data files to the SDP Toolkit for EOS-AM processing:
- a.      Platform position velocity vectors
  - b.      Platform attitude/attitude rate data (expressed as Euler angles in radians and radians/s, respectively)
- S-DPS-30740      The DPREP CI shall provide to the SDP Toolkit orbit and attitude data in the native format of the host hardware for TRMM processing.
- S-DPS-30750      The DPREP CI shall provide to the SDP Toolkit orbit and attitude data in the native format of the host hardware for EOS-AM processing.
- S-DPS-30760      The DPREP CI shall provide to the SDP Toolkit orbit and attitude data in HDF-EOS format for TRMM processing.
- S-DPS-30770      The DPREP CI shall provide to the SDP Toolkit orbit and attitude data in HDF-EOS format for EOS-AM processing.

#### **4.7.3.8 Provide SDP Toolkit Access to SDPF L0 Data**

The SDP Toolkit requires an uniform interface to provide access to SDPF L0 data. The DPREP CI provides L0 files in a form acceptable to the SDP Toolkit.

- S-DPS-30800      The DPREP CI shall provide to the SDP Toolkit SDPF-generated L0 production data files with unique APIDs as defined in the SDPF-ECS ICD.
- S-DPS-30810      The DPREP CI shall provide to the SDP Toolkit SDPF-generated L0 production data files as two separate files: (a) A Standard Format Data Unit (SFDU) header file, (b) Data Set File as defined in the SDPF-ECS ICD.

#### **4.7.3.9 Provide SDP Toolkit Access to EDOS L0 Data**

The SDP Toolkit requires an uniform interface to provide access to EDOS L0 data. The DPREP CI provides L0 files in a form acceptable to the SDP Toolkit.

- S-DPS-30900      The DPREP CI shall provide to the SDP Toolkit EDOS-generated L0 PDS as header and quality parameters all contained in the same physical file as the L0 telemetry packets.
- S-DPS-30910      The DPREP CI shall provide to the SDP Toolkit EDOS-generated L0 PDS containing header information as specified in the EDOS-ECS ICD.
- S-DPS-30920      The DPREP CI shall provide to the SDP Toolkit EDOS-generated L0 PDS containing quality information as specified in the EDOS-ECS ICD.

#### **4.7.3.10 Provide SDP Toolkit Access to L0 Data in General**

The SDP Toolkit requires an uniform interface for providing access to SDPF L0 data. The DPREP CI provides some minimum information to the SDP Toolkit in the form of additional metadata and/or compatible data format.

- |             |  |
|-------------|--|
| S-DPS-31010 | The DPREP CI shall provide to the SDP Toolkit EDOS-generated L0 header in the native format of the host hardware.  |
| S-DPS-31020 | <p>The DPREP CI shall provide, at a minimum, the following metadata information to the SDP Toolkit with SDPF-generated L0 data:</p> <ul style="list-style-type: none"><li>a. Actual start time of staged L0 data</li><li>b. Actual end time of staged L0 data</li><li>c. Number of physical L0 data files staged</li><li>d. Start time of L0 data as requested by EOS investigators through the planning/processing system</li><li>e. End time of L0 data as requested by EOS investigators through the planning/processing system</li><li>f. APID of each L0 data file, of the L0 data files are APID-unique</li><li>g. Orbit number of the staged L0 data file</li></ul> |
| S-DPS-31030 | <p>The DPREP CI shall provide, at a minimum, the following metadata information to the SDP Toolkit with EDOS-generated L0 data:</p> <ul style="list-style-type: none"><li>a. Actual start time of staged L0 data</li><li>b. Actual end time of staged L0 data</li><li>c. Number of physical L0 data files staged</li><li>d. Start time of L0 data as requested by EOS investigators through the planning/processing system</li><li>e. End time of L0 data as requested by EOS investigators through the planning/processing system</li><li>f. APID of each L0 data file, of the L0 data files are APID-unique</li><li>g. Orbit number of the staged L0 data file</li></ul> |

#### **4.7.3.11 Accept and Convert Selected Non-Standard EOS Products**

Non-standard EOS products are TOMS and Government Furnished Equipment (GFE) data sets.

S-DPS-31620      The DPREP CI shall maintain and prepare on an ad hoc basis, at a minimum, the following GFE static data sets for input to the SDP Toolkit:

- a.      Digital terrain map data sets
- b.      Land/Sea data sets
- c.      Digital political map data sets

#### **4.7.3.12 Additional Metadata Extraction for Certain Ancillary Data Sets**

For FDF-repaired/refined orbit/attitude data and certain external ancillary data, some additional metadata generation will be required in addition to the minimal metadata extraction done by INGST CI.

S-DPS-31700      The DPREP CI shall extract metadata attributes for TBD FDF and external Ancillary Data sets, in addition to metadata extraction by the INGST CI.

#### **4.7.4 AITTL- Algorithm Integration and Test CSCI**

The purpose of the Algorithm Integration and Test Tools (AITTL) Computer Software Configuration Item (CSCI) is to facilitate the transition of the science processing algorithms and user methods which have been developed externally within the Science Computing Facility (SCF) or at a user site into the operational environment of the Distributed Active Archive Center (DAAC) and to validate the results of these algorithms/methods within the operational environment. Most of the tools comprising the integration and test (I&T) environment will be off-the-shelf (OTS), with a few special tools to handle ECS specific issues.

The Algorithm Integration & Test Tools CSCI consists of the software tools and procedures required to do integration and test of the Science Software. Algorithm I&T hardware (e.g., I&T workstations, and hardware for the test and backup strings) is defined in a separate hardware configuration item (hardware CI or HWCI).

The boundaries between the hardware, software, and operations associated with algorithm integration and test are not strictly separable. Operational procedures drive requirements for software tools and hardware. The selection of commercial off-the-shelf (COTS) software to satisfy software requirements is intimately associated with the selection of hardware platforms. Requirements for profiling and certain types of code checking, which exist only for the purposes of I&T, may be satisfied by the hardware CI, since many of these utilities are routinely bundled with operating systems and development environments.

The Algorithm Integration & Test Tools CSCI currently contains the following categories of requirements:

Requirements for tools:

- *Delivery of Science Software*—probably an ingest client supplied by Ingest
- *Viewing Science Software Documentation*—tools to display and print documentation that comes with a delivery
- *Checking Coding Standards*—tools to check compliance with ESDIS standards, guidelines for the Science Software, and SDP Toolkit usage requirements
- *Checking for Programming Errors*—static and dynamic code checkers
- *Data Visualization*—data visualization tools
- *File Comparison*—tools to compare test output files generated at the SCF with the outputs of the same tests run at the DAAC. These tools need to be able to ignore small differences due to differences in precision, and therefore are likely to be custom tools, not COTS.
- *Profiling*—tools to measure performance and resource usage
- *Adding an Algorithm Update to a Data Server*—GUI interfacing with the Data Server to add a tested algorithm to the archives and to create new data types
- *Updating the PGE Database*—GUI interfacing with the Planning Subsystem to add the resource usage information to the planning and processing databases
- *Configuration Management*—CM tool and problem tracking tool, supplied by CSMS
- *Report Generation*—word processors, spreadsheets, plotting programs, drawing tools
- *Manual Staging of Inputs*—GUI interfacing with the Data Server to retrieve data files from the archives to be used as test inputs
- *Display of Product Metadata*—tool to allow the Product metadata to be inspected for correctness

Operational requirements:

- *Inspection of the Delivery Package*—procedures for receiving and running initial checks on the Science Software Delivery
- *Integration*—procedures for integrating the Science Software into the DAAC environment
- *Acceptance*—procedures for acceptance testing the Science Software
- *Reporting*—reporting requirements for Science Software Integration and Test

#### **4.7.4.1 Delivery of Science Software**

The first step in the integration and test process is the delivery of the Science Software to the DAAC. These requirements relate to the ability of the system to ingest a Science Software Delivery, and to transfer the delivery to the integration and test personnel.

S-DPS-40010	The AITTTL CI shall have the capability to receive a Science Software Delivery from the SCF electronically via the network.
S-DPS-40020	The AITTTL CI shall have the capability to receive a Science Software Delivery from the Science Data Server.
S-DPS-40030	The AITTTL CI shall provide the operations staff with the capability to register a Subscription with the Data Server to be notified when a new Science Software Delivery is received.
S-DPS-40040	The AITTTL CI shall provide the operations staff with the capability to request transfer of the Science Software Delivery files from the Data Server to the local I&T area.

#### **4.7.4.2 Viewing Science Software Documentation**

A Science Software Delivery usually will contain some number of documentation files. These requirements relate to the need for tools that will allow the integration and test personnel to read this documentation.

S-DPS-40100	The AITTTL CI shall provide the operations staff with the capability to display Science Software documentation stored in any of the following formats: a) PostScript, b) ASCII, c) Hypertext Markup Language (HTML), d) Microsoft® Word, e) WordPerfect, f) Adobe Acrobat Portable Document Format (PDF).
S-DPS-40110	The AITTTL CI shall provide the operations staff with the capability to print Science Software documentation stored in any of the following formats: a) PostScript, b) ASCII, c) Hypertext Markup Language (HTML), d) Microsoft Word, e) WordPerfect, f) Adobe Acrobat Portable Document Format (PDF).

#### **4.7.4.3 Checking Coding Standards**

Science Software source code and shell scripts are required to follow certain coding standards in order to be portable and in order to run properly with the SDP Toolkit libraries. One of the functions of integration and test is therefore to ensure that the Science Software does in fact follow these coding standards. These requirements relate to the need for automated standards checking tools.

S-DPS-40200	The AITTTL CI shall have the capability to verify that Science Software source code written in C complies with the ANSI standard specification for C.
S-DPS-40210	The AITTTL CI shall have the capability to verify that Science Software source code written in FORTRAN77 complies with the ANSI standard specification for FORTRAN77.

S-DPS-40220	<p>When checking code for compliance with the ANSI standard specification for FORTRAN77, the AITTL CI shall provide the option of ignoring (i.e., not flagging as non-compliant) any of the following permitted extensions:</p> <ul style="list-style-type: none"> <li>(a) INCLUDE statement</li> <li>(b) BYTE data type</li> <li>(c) DO WHILE</li> <li>(d) EXIT</li> <li>(e) ENDDO</li> <li>(f) STRUCTURE data types</li> <li>(g) names up to 31 characters long</li> <li>(h) IMPLICIT NONE statement</li> <li>(i) block IF with ELSE IF and END IF</li> <li>(j) in-line comments</li> <li>(k) extended character set to include lower case, underscore, left and right angle brackets, quotation mark, percent sign, and ampersand</li> <li>(l) initialization of data in declaration</li> <li>(m) long line extensions beyond 72 characters per line</li> </ul>
S-DPS-40230	The AITTL CI shall have the capability to verify that Science Software source code written in FORTRAN 90 complies with the ANSI standard specification for FORTRAN 90.
S-DPS-40240	The AITTL CI shall have the capability to verify that Science Software source code written in FORTRAN 90 does not use any features of the language, with the exception of DO WHILE, which are marked for removal in the next release of the FORTRAN standard.
S-DPS-40250	The AITTL CI shall have the capability to verify that Science Software source code written in Ada complies with the military specification MIL-STD-1815-A.
S-DPS-40260	The AITTL CI shall have the capability to verify that Science Software source code is POSIX-compliant.
S-DPS-40270	The AITTL CI shall have the capability to verify that the first line of each Science Software script specifies one of the following shells: (a) C, (b) Korn, (c) perl, (d) POSIX.
S-DPS-40280	The AITTL CI shall have the capability to verify that Science Software source code and Science Software scripts follow the following SDP Toolkit

usage requirements (from 194-809-SD4-001, PGS Toolkit Users Guide for the ECS Project):

- (a) Source code does not make any prohibited POSIX function calls.
- (b) The Status Message Text Files have the correct format.
- (c) None of an operator-specified set of Toolkit functions is called more than once per PGE.
- (d) Of an operator-specified set of Toolkit functions, none is called by a PGE prior to another operator-specified set of Toolkit functions.

S-DPS-40290      The AITTL CI shall have the capability to verify that Science Software source code written in C follows the following coding standards (from 423-16-01, Data Production Software and Science Computing Facility (SCF) Standards and Guidelines):

- (a) Bit operations must not be used on signed numbers.

S-DPS-40300      The AITTL CI shall have the capability to determine if Science Software source code written in C follows the following coding guidelines (from 423-16-01, Data Production Software and Science Computing Facility (SCF) Standards and Guidelines):

- (a) `<>` and `""` notation should be used for including standard C header files and programmer created header files, respectively.
- (b) All variables should be initialized prior to use. All non-static variables should be re-initialized prior to use each time the module that defines them is re-entered.
- (c) Loop control variables should be integers.
- (d) Unconditional branching (i.e., GOTO) should only be used within nested structures and should only reference a label further down in the code.
- (e) A pointer should have the same type as the variable that it points to.
- (f) Implicit type casts should not be used.
- (g) Float and double variables should not be compared for strict equality or inequality.
- (h) All functions should be typed.
- (i) All functions should be prototyped.
- (j) Functions which do not return a value should be typed as void.

- (k) The div and ldiv standard library functions should be used instead of the % operator to obtain remainders.

S-DPS-40310

The AITTL CI shall have the capability to determine if Science Software source code written in FORTRAN follows the following coding guidelines (from 423-16-01, Data Production Software and Science Computing Facility (SCF) Standards and Guidelines):

- (a) All variables should be initialized prior to use.
- (b) PARAMETER variables should not be redefined.
- (c) COMMON blocks should only be defined in INCLUDE files.
- (d) COMMON blocks should only contain variables/arrays of the same type.
- (e) Loop control variables should be integers.
- (f) Unconditional branching (i.e., GOTO) should only be used within nested structure.
- (g) Computed and arithmetic GOTOs should not be used.
- (h) DO-loops should be terminated with CONTINUE or ENDDO.
- (i) The index of a DO-loop should not be modified inside the loop.
- (j) Real and complex variables should not be compared for strict equality or inequality.
- (k) Generic intrinsic functions should be used instead of type-specific functions.

S-DPS-40320

The AITTL CI shall have the capability to verify that Science Software source code includes headers as specified in 423-16-01, Data Production Software and Science Computing Facility (SCF) Standards and Guidelines.

S-DPS-40330

The AITTL CI shall have the capability to extract from Science Software source code the header data listed as "required" in 423-16-01, Data Production Software and Science Computing Facility (SCF) Standards and Guidelines.

S-DPS-40340

The AITTL CI shall have the capability to generate report files describing the results of standards checking.

#### **4.7.4.4 Checking for Programming Errors**

When problems occur during the integration and test process, the integration and test personnel will need to have diagnostic tools to help them to locate errors. One such set of tools are static and dynamic code analyzers to pinpoint errors such as memory leaks, out of bounds indexing,



argument list mismatches, and incomplete code coverage. These requirements relate to the need for such tools.

S-DPS-40400	The AITTTL CI shall have the capability to determine if the Science Software contains memory leaks.
S-DPS-40405	The AITTTL CI shall have the capability to determine if the Science Software contains out of bounds indexing.
S-DPS-40410	The AITTTL CI shall have the capability to determine if the Science Software contains argument list mismatches (type and number of arguments).
S-DPS-40430	The AITTTL CI shall have the capability to generate report files describing the results of code analysis.

#### **4.7.4.5 Data Visualization**

Another set of diagnostic tools required by the integration and test personnel are data visualization tools to facilitate the examination of Science Software input, output, and intermediate data files. These requirements relate to the need for data visualization tools.

Note: The data visualization requirements for integration and test are not necessarily the same as the data visualization requirements for external users.

S-DPS-40700	The data visualization capability of the AITTTL CI shall include the capability to display data in hexadecimal, octal, decimal, or ASCII form.
S-DPS-40710	The data visualization capability of the AITTTL CI shall include the capability to display data as a two- or three-dimensional image.
S-DPS-40720	The data visualization capability of the AITTTL CI shall include the capability to display data as a two- or three-dimensional plot.
S-DPS-40730	The data visualization capability of the AITTTL CI shall include the capability to difference data and to display the differences as a two- or three-dimensional image or plot.
S-DPS-40740	The data visualization capability of the AITTTL CI shall include the capability to produce and play a "movie loop" of data in two- or three-dimensional image or plot form.
S-DPS-40750	The data visualization capability of the AITTTL CI shall include the capability to display an arbitrary two-dimensional slice of a three-dimensional image or plot.
S-DPS-40760	The data visualization capability of the AITTTL CI shall include the capability to rotate a three-dimensional image or plot about an arbitrary axis.
S-DPS-40770	The data visualization capability of the AITTTL CI shall include providing the user with the option to specify the color table for new or existing image displays.

S-DPS-40780	The data visualization capability of the AITTTL CI shall include providing the user with the option to specify the axis limits for new or existing plot displays.
S-DPS-40790	The data visualization capability of the AITTTL CI shall include providing the operations staff with the option to specify the parameter assigned to each axis in new or existing plot or image displays.
S-DPS-40800	The data visualization capability of the AITTTL CI shall include the capability to display simultaneously multiple views of the same or different data in different windows.
S-DPS-40810	The data visualization capability of the AITTTL CI shall include the capability to save any plot, image, or hex/decimal/octal/ASCII dump to a file.
S-DPS-40820	The data visualization capability of the AITTTL CI shall include feature enhancement capabilities, including but not limited to (1) histogram equalization and (2) edge enhancement.
S-DPS-40830	The data visualization capability of the AITTTL CI shall include the capability to read ASCII, binary, or HDF files.
S-DPS-40840	The data visualization capability of the AITTTL CI shall include the capability to allow the operations staff to specify a custom input data format.

#### **4.7.4.6 File Comparison**

The bulk of the acceptance testing will consist in re-running tests at the DAAC that have previously been run at the SCF, and comparing the outputs produced at the two sites. Therefore, there is a need for a file comparison utility. A particular requirement of ECS is that this utility be able to compare files that were produced on machines with different precision, and to filter out differences that are due only to precision differences. These requirements relate to the need for such a specialized file comparison tool.

S-DPS-40900	The AITTTL CI shall have the capability to find all differences between two data files which are greater than some specified absolute threshold.
S-DPS-40910	The AITTTL CI shall have the capability to find all differences between two data files which are greater than some specified relative threshold.
S-DPS-40920	The AITTTL CI shall have the capability to generate report files describing the results of file comparisons.
S-DPS-40930	The file comparison capability of the AITTTL CI shall include the capability to read ASCII, binary, or HDF files.
S-DPS-40940	The file comparison capability of the AITTTL CI shall include the capability to allow the operations staff to specify a custom data format.

#### 4.7.4.7 Profiling

Another job of the integration and test process is to measure certain resource requirements of the Science Software, such as disk space requirements, memory requirements, CPU time, and so on. There are a couple of reasons for this. One is for diagnostic purposes—if the actual and predicted resource requirements are wildly divergent, there is probably a problem somewhere. Another is to collect certain parameters that are required by Planning and Processing to run the Science Software properly; these parameters must be measured by the integration and test personnel and loaded into the PGE Database for this purpose (see Section 4.7.4.9, Updating the PGE Database). These requirements relate to the need for profiling tools to collect these measurements.

S-DPS-41000	The AITTTL CI shall have the capability to measure the CPU time of a process.
S-DPS-41005	The AITTTL CI shall have the capability to measure the wall clock time of a process.
S-DPS-41010	The AITTTL CI shall have the capability to measure the CPU time of each procedure within a process.
S-DPS-41015	The AITTTL CI shall have the capability to measure the wall clock time of each procedure within a process.
S-DPS-41020	The AITTTL CI shall have the capability to measure the memory usage of a process.
S-DPS-41030	The AITTTL CI shall have the capability to measure the disk space usage of a process.
S-DPS-41035	The AITTTL CI shall have the capability to count the number of page faults for a process.
S-DPS-41040	The AITTTL CI shall have the capability to count the number of I/O accesses made by a process to each of its input and output data files.
S-DPS-41050	The AITTTL CI shall have the capability to generate report files discussing the results of profiling activities.

#### 4.7.4.8 Adding an Algorithm or Algorithm Update to a Data Server

Once the Science Software has been successfully integrated and tested, the delivery files along with additional files and reports generated during the integration and test process, must be archived in the Data Server and made accessible to external users. These requirements relate to the need for an interface to allow the integration and test personnel to add the files to the Data Server.

S-DPS-41100	The AITTTL CI shall provide to the operations staff, via a GUI, the capability to display a list of Science Software Archive Packages in the Data Server.
S-DPS-41110	The AITTTL CI shall provide to the operations staff, via a GUI, the capability to display the metadata for a specific Science Software Archive Package.

S-DPS-41120	The AITTL CI shall provide to the operations staff, via a GUI, the capability to display a list of the files that comprise a specific Science Software Archive Package.
S-DPS-41130	The AITTL CI shall provide to the operations staff, via a GUI, the capability to retrieve a copy of a specified file belonging to a specific Science Software Archive Package.
S-DPS-41140	The AITTL CI shall provide to the operations staff, via a GUI, the capability to add a new Science Software Archive Package to the Data Server.
S-DPS-41150	The AITTL CI shall provide to the operations staff, via a GUI, the capability to add or remove a file to or from the set of files comprising a specific Science Software Archive Package.
S-DPS-41160	The AITTL CI shall provide to the operations staff, via a GUI, the capability to edit the metadata for a specific Science Software Archive Package.
S-DPS-41170	The AITTL CI shall provide to the operations staff, via a GUI, the capability to remove a specific Science Software Archive Package from the Data Server.
S-DPS-41180	The AITTL CI shall provide to the operations staff, via a GUI, the capability to define new data types for new Products produced by an Science Software Archive Package.
S-DPS-41190	The GUI for adding an Science Software Archive Package to the Data Server shall have the capability of accepting its inputs from a file.
S-DPS-41200	The GUI for adding an Science Software Archive Package to the Data Server shall provide the operations staff with the ability (a) to restrict update access to the Data Server to authorized personnel and (b) to maintain a record of updates made.

#### **4.7.4.9 Updating the PGE Database**

In order for the Planning and Processing CIs to run the Science Software correctly, they must have access to certain resource usage information, such as the amount of disk space a PGE will consume, how long it will run, and so on (see Section 4.7.4.7, Profiling). This information is stored in the PGE Database and accessed as required by Planning and Processing. Therefore, the integration and test personnel will need an interface to the PGE Database in order to load this information. These requirements relate to the need for such an interface.

S-DPS-41300	The AITTL CI shall provide to the operations staff, via a GUI, the capability to display a list of PGE Database Entries.
S-DPS-41310	The AITTL CI shall provide to the operations staff, via a GUI, the capability to display a specific PGE Database Entry.

S-DPS-41320	The AITTTL CI shall provide to the operations staff, via a GUI, the capability to modify a specific PGE Database Entry.
S-DPS-41330	The AITTTL CI shall provide to the operations staff, via a GUI, the capability to add a new PGE Database Entry.
S-DPS-41340	The AITTTL CI shall provide to the operations staff, via a GUI, the capability to remove a specific PGE Database Entry.
S-DPS-41350	The AITTTL CI shall provide to the operations staff, via a GUI, cut, copy, and paste capability for a PGE Database Entry.
S-DPS-41355	The GUI for updating the PGE Database shall provide the operations staff with the ability (a) to restrict update access to the PGE Database to authorized personnel and (b) to maintain a record of updates made.
S-DPS-41360	The GUI for updating the PGE Database shall have the capability of accepting its inputs from a file.

#### **4.7.4.10 Configuration Management**

From the time that the Science Software Delivery is received, and throughout the integration and test process, the delivery files and additional test files must be placed under configuration control. These requirements relate to the need for configuration management tools.

S-DPS-41400	The DAAC I&T environment shall include access to a configuration management tool supplied by MSS.
S-DPS-41410	The DAAC I&T environment shall include access to a problem tracking tool supplied by MSS.

#### **4.7.4.11 Report Generation**

The integration and test personnel will need to write a number of reports, as well as keep an integration and test log that can be accessed by certain external, authorized users (such as the developers). These requirements relate to the need for tools to allow such reports and logs to be created and maintained.

S-DPS-41500	The AITTTL CI shall provide the capability for operations staff to write reports. This capability will include: (a) word processing, (b) spreadsheet, (c) plotting, (d) drawing.
S-DPS-41510	The AITTTL CI shall provide templates for reports to be written by the operations staff. (NOTE: It is assumed that these templates will be developed by the Science Office.)
S-DPS-41520	The AITTTL CI shall provide the capability for operations staff to keep a running log of integration and test activities on-line.

S-DPS-41530            The AITTTL CI shall provide the capability for authorized users to examine the integration and test logs and other reports.

#### **4.7.4.12   Manual Staging of Inputs**

During the initial stages of integration and test, the integration and test personnel may well need to run PGEs manually, rather than going through the planning and processing system. If this is done, any required inputs that are located in the Data Server will need to be staged manually (since data staging is normally done by planning and processing). These requirements relate to the need for a tool to manually stage data.

S-DPS-41895            The AITTTL CI shall provide to the operations staff the capability to retrieve a specified data file from local DAAC storage.

S-DPS-41900            The AITTTL CI shall provide to the operations staff, via a GUI, the capability to retrieve a specified data file from a specified Data Server.

#### **4.7.4.13   Display of Product Metadata**

As part of verifying that a test run is correct, the integration and test personnel must be able to examine the Product metadata that is generated by the run. These requirements relate to the need for a tool to display Product metadata.

S-DPS-42000            The AITTTL CI shall provide the operations staff with the capability to view the metadata associated with a data file.

S-DPS-42005            The AITTTL CI shall provide the operations staff with the capability to edit the metadata associated with a data file.

S-DPS-42010            The AITTTL CI shall provide the operations staff with the capability to write the metadata associated with a data file to a report file.

#### **4.7.4.14   Inspection of the Delivery Package**

The following operational requirements deal with the inspection of a new science software delivery. The contents of the Package are checked against the file inventory found in the Delivery Memo file in the Package. In addition, the Package contents are checked for completeness, consistency and correctness. Source code and scripts are checked against standards. Test plans and documentation are reviewed for completeness.

S-DPS-42100            The operations staff shall place a Science Software Delivery Package in a non-public directory accessible to the hardware scheduled to be used for I&T.

S-DPS-42110            The operations staff shall read and/or review all documentation included in the Delivery Package.

S-DPS-42120            The operations staff shall perform automated checking of all source code included in the Delivery Package against established coding standards and guidelines.

S-DPS-42130	The operations staff shall perform automated checking of all scripts included in the Delivery Package against established coding standards and guidelines.
S-DPS-42140	The operations staff shall have the capability to perform static analyses of source code for (at a minimum) argument mismatches and variables set before used.
S-DPS-42150	The operations staff shall have the capability to examine all test data and expected test results files included in the Delivery Package to verify completeness and correct format.
S-DPS-42160	The operations staff shall have the capability to examine all coefficient files included in the Delivery Package to verify completeness and correct format.
S-DPS-42170	The operations staff shall have the capability to compile all FORTRAN77, FORTRAN 90 and C source code included in the Delivery Package.
S-DPS-42175	The operations staff shall have the capability to compile all Ada source code included in the Delivery Package for CERES.
S-DPS-42180	The operations staff shall check source code, coefficient files, test plans, test data, expected test results and other documentation into the Configuration Management tool.
S-DPS-42190	The operations staff (and others who are specifically authorized) shall have the capability to check out source code, coefficient files, test plans, test data, expected test results and other documentation from the Configuration Management tool.
S-DPS-42200	Whenever a Science Software Delivery is received by the AITTL CI directly from the SCF via the network, the operations staff shall notify the SCF that the delivery has been received successfully.

#### **4.7.4.15 Integration**

The following operational requirements deal with the integration of the science software delivery into the production environment. Source code is first compiled and object code is linked with appropriate libraries. Initially, the Science Software is linked with the SCF version of the Toolkit. The output files are compared to the test output files received in the Delivery Package. Performance statistics are monitored and recorded during execution of the software. The software modules are run with dynamic code checkers and debuggers to help identify any problems.

The Science Software object modules are then linked with the Toolkit version resident at the DAAC for further integration with the ECS environment. The output files are again compared with the test output files.

S-DPS-42300	The operations staff shall have the capability to link FORTRAN77, FORTRAN 90 and C object code with the SCF version of the SDP Toolkit.
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S-DPS-42305	The operations staff shall have the capability to link Ada object code for CERES with the SCF version of the SDP Toolkit.
S-DPS-42310	The operations staff shall link FORTRAN77, FORTRAN 90 and C object code with the DAAC version of the SDP Toolkit.
S-DPS-42315	The operations staff shall link Ada object code for CERES with the DAAC version of the SDP Toolkit.
S-DPS-42320	The operations staff shall have the capability to link FORTRAN77, FORTRAN 90 and C object code with other libraries.
S-DPS-42325	The operations staff shall have the capability to link Ada object code for CERES with other libraries.
S-DPS-42330	The operations staff shall have the capability to run binary executables without impacting other ongoing DAAC activities.
S-DPS-42340	The operations staff shall have the capability to perform dynamic analyses of source code for (at a minimum) memory leaks, out of bounds indexing and distribution of resource demands.
S-DPS-42350	The operations staff shall have the capability to execute perl, C shell or Bourne shell scripts.
S-DPS-42360	The operations staff shall have the capability of determining the computing resources utilized by an execution of a PGE; viz., PGE CPU time, system CPU time, elapsed time, percent elapsed time, shared memory use, maximum memory used, number of page faults, number of swaps, number of block input operations, and number of block output operations.
S-DPS-42365	The operations staff shall have the capability to use MSS profiling capabilities to determine the computing resources utilized by the execution of a chain of PGEs.
S-DPS-42370	The operations staff shall collect during I&T the performance and resource utilization information needed for entry into or update of the PGE data base.

#### **4.7.4.16 Acceptance Testing**

The following operational requirements deal with acceptance testing of the science software delivery. The test plan(s) are executed to determine how well the software operates and interfaces with its production environment. Tests employing static input data are performed to ensure that the Science Software performs in the same manner at the DAAC as at their SCF. Additionally, the Science Software undergoes a parallel or commissioning testing period prior to operational implementation.

S-DPS-42500	The operations staff shall execute the Test Plans included in the Delivery Package.
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S-DPS-42510	The operations staff shall have the capability of displaying Data Products.
S-DPS-42520	The operations staff shall have the capability of displaying data in intermediate files used to generate a Data Product.
S-DPS-42530	The operations staff shall have the capability of displaying data in input files used to generate a Data Product.
S-DPS-42540	The operations staff shall have the capability of displaying data in coefficient files used to generate a Data Product.
S-DPS-42550	The operations staff shall have the capability of displaying the Ancillary Data used to generate a Data Product .
S-DPS-42560	The operations staff shall have the capability of viewing the Status Information files associated with the generated Data Product.
S-DPS-42570	The operations staff shall have the capability of displaying all metadata associated with the generation of a Data Product.
S-DPS-42580	The operations staff shall have the capability of comparing data in two coefficient files.
S-DPS-42590	The operations staff shall have the capability of comparing two Data Product files.
S-DPS-42600	The operations staff shall have the capability of comparing data in two intermediate files.
S-DPS-42610	The operations staff shall enter new PGEs into the PGE Database, along with their performance and resource utilization information.
S-DPS-42620	The operations staff shall update information the PGE Database as necessary to reflect changes in performance and resource utilization resulting from a modification to a PGE.
S-DPS-42630	The operations staff shall have the capability of run PGEs in a parallel test or for a commissioning period, utilizing the Planning and Processing Subsystems and the Product output flagged as "test".
S-DPS-42640	The operations staff shall have the capability to send the test results to the SCF for analysis.
S-DPS-42650	The operations staff shall have the capability to write ad hoc test tools using the perl, C shell or Bourne shell script languages.
S-DPS-42660	The operations staff shall have the capability to write ad hoc test tools using the FORTRAN77, FORTRAN 90 and C programming languages.

#### **4.7.4.17 Reporting**

The following operational requirements deal with reporting of I&T activities. The steps performed during the I&T of the Science Software, results and actions are recorded. Discrepancy reports and their resolution must also be tracked. Various status reports may be required, depending on the nature and extent of the I&T.

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| S-DPS-42700 | The operations staff shall have the capability to enter and track discrepancy reports related to AI&T.                                    |
| S-DPS-42710 | The operations staff shall have the capability to send to and receive email messages from Science Software Developer staff and ECS staff. |
| S-DPS-42720 | The operations staff shall have the capability to engage in teleconferences with Science Software Developer staff and ECS staff.          |
| S-DPS-42740 | The operations staff shall reports on the status of I&T-related discrepancy reports.  |
| S-DPS-42750 | The operations staff shall have the capability of record each step performed during I&T, the results and actions initiated, if any.       |
| S-DPS-42760 | The operations staff shall report on the status of the I&T activities each PGE.   |
| S-DPS-42770 | The operations staff shall have the capability of writing an Inspection Report for each Science Software Delivery.                        |
| S-DPS-42780 | The operations staff shall have the capability of writing an Integration Report for each Science Software Delivery.                       |
| S-DPS-42790 | The operations staff shall have the capability of writing an Acceptance Test Report for each Science Software Delivery.                   |

#### **4.7.5 SPRHW - Science Processing HWCI**

The Science Processing HWCI (SPRHW) is the primary HWCI in the Processing Subsystem containing staging (working storage), input/output (I/O), and processing resources necessary to perform routine processing and subsequent reprocessing. This HWCI consists of 2 components: (1) Science Processing and (2) Processing Queue Management.

##### **4.7.5.1 Functional Requirements**

This section contains the functional requirements for the Science Processing HWCI for each release and DAAC site.

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| S-DPS-60010 | The SPRHW CI shall support the capability to manage, queue, and execute processes on the processing resources at each DAAC site. |
| S-DPS-60020 | The SPRHW CI shall support the capability to stage and destage data.   |

S-DPS-60050	The SPRHW CI shall contain and/or provide access to staging (working storage), I/O and processing resources necessary to perform routine processing.
S-DPS-60060	The SPRHW CI shall have a Fail-Soft capability to meet RMA requirements.
S-DPS-60080	The SPRHW CI shall have provision for Initialization, Recovery, and an orderly shutdown.
S-DPS-60090	The SPRHW CI shall support startup and initialization to be completed within 30 minutes (TBR)
S-DPS-60100	The SPRHW CI shall support shutdown to be completed within 30 minutes (TBR).
S-DPS-60110	The SPRHW CI shall have a fault detection/fault isolation capability of major HWCI component failures without interfering with operations.
S-DPS-60120	The SPRHW CI shall have a status monitoring capability.
S-DPS-60135	The SPRHW CI design and implementation shall have the flexibility to accommodate Science Processing expansion up to a factor of 3 in its capacity with no changes in its design and up to a factor of 10 without major changes to its design.
S-DPS-60160	The SPRHW CI shall support collection and maintenance for Fault Management, configuration, performance, accountability, and security of Processing CI hardware resources.

#### 4.7.5.2 Performance Requirements

This section contains the performance requirements for the SPRHW CI for each release and DAAC site. Processing load (i.e., MFLOPs) is phased and in accordance with the Technical Baseline.

S-DPS-60230	<p>The SPRHW CI shall provide a phased capacity to support:</p> <ol style="list-style-type: none"> <li>for pre-launch AI&amp;T at launch minus 2 years: <math>0.3 X</math>, where <math>X</math> is defined as the at-launch processing estimate</li> <li>for pre-launch AI&amp;T and System I&amp;T at-launch minus 1 year: <math>1.2 X</math>, where <math>X</math> is defined as the at-launch processing estimate</li> <li>for post-launch AIT, standard processing, and reprocessing, starting at launch plus 1 year: <math>2.2 X</math>, where <math>X</math> is defined as the standard processing estimate for that period</li> <li>for post-launch AIT, standard processing, and reprocessing, starting at launch plus 2 years: <math>4.2 X</math>, where <math>X</math> is defined as the standard processing estimate for that period.</li> </ol>
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S-DPS-60240	The SPRHW CI shall support a total processing requirement as specified by Table 1 (Appendix E).
S-DPS-60250	The SPRHW CI shall be able to support a data volume (GB/ Day) as specified by Table 1 (Appendix E).
S-DPS-60330	The SPRHW CI shall have the capacity to support I/O to temporary and intermediate storage or multiple passes over input Products as required by individual science software.
S-DPS-60350	The SPRHW CI shall generate Level 1 Standard Products within 24 hours after processing is initiated.
S-DPS-60360	The SPRHW CI shall generate Level 2 Standard Products within 24 hours after processing is initiated.
S-DPS-60370	The SPRHW CI shall generate Level 3 Standard Products within 24 hours after processing is initiated.
S-DPS-60380	The SPRHW CI shall generate and make available to the users Level 4 Standard Products within one week after the availability to ECS of all necessary Level 3 and other input data sets.

#### **4.7.5.3 Reliability/ Maintainability/ Availability Requirements**

This section contains the Reliability/Maintainability/Availability (RMA) requirements for the Science Processing HWCI for each release and DAAC site. In addition, Mean-time to Restore requirement, which is related to system recovery, is also contained in this section.

S-DPS-60410	The SPRHW CI shall be capable of operating in a 24 hour per day, 7 days a week mode.
S-DPS-60430	The SPRHW CI shall have a design goal of having no single point of failure.
S-DPS-60440	SPRHW CI functions shall have an operational availability of TBD as a minimum and Mean Down Time (MDT) of TBD hours or less.
S-DPS-60450	Each computer providing product generation capability shall have an operational availability of 0.95 at a minimum.
S-DPS-60460	The SPRHW CI shall have a Mean Time Between Failure (MTBF) of TBD hours for each release and corresponding DAAC sites.
S-DPS-60470	The SPRHW CI shall have a Mean Time to Restore (MTTRes) of 30 minutes (TBR).
S-DPS-60490	The SPRHW CI shall be capable of supporting system development without impact to normal operations.

S-DPS-60500	The SPRHW CI shall be capable of supporting science software test without impact to normal operations.
S-DPS-60510	The SPRHW CI shall be capable of supporting system upgrades while meeting specified operational availability requirements.
S-DPS-60520	The SPRHW CI elements and components shall include the on-line (operational mode) and off-line (test mode) fault detection and isolation capabilities required to achieve the specified operational availability requirements.
S-DPS-60530	The SPRHW CI, in accordance with the ECS RMA Program, shall adhere to GSFC 420-05-03 Performance Assurance Requirements for the EOSDIS.
S-DPS-60540	The SPRHW CI Reliability predictions shall be calculated in accordance with the parts count analysis method, Appendix A of MIL-HDBK-217F, Reliability Prediction of Electronic Equipment.
S-DPS-60550	The SPRHW CI Maintainability shall be predicted in accordance with MIL-HDBK-472, Maintainability Prediction, Procedure IV.

#### **4.7.5.4 Interface Requirements**

This section contains the Interface requirements for the SPRHW CI.

S-DPS-60610	The SPRHW CI platforms shall have provision for interfacing with one or more Local Area Networks (LANs).
S-DPS-60612	The SPRHW CI platforms shall have provision for interfacing with Data Server.
S-DPS-60615	The SPRHW CI platforms shall have provision for interfacing with Ingest
S-DPS-60617	The SPRHW CI platforms shall have provision for interfacing with Planning.

#### **4.7.5.5 Physical Requirements**

This section contains the physical requirements for the Science Processing HWCI for each release and DAAC site. These requirements are related to power, air conditioning, grounding, fire alarm, acoustical, physical interface, and footprint sizes. The ECS Facilities Plan (DID 302/DV1) and Individual Facility requirements (DID 303/DV1) are reference documents related to this area.

S-DPS-60710	The electrical power requirements for SPRHW CI equipment shall be in accordance with Individual Facility Requirements (DID 303/DV1) and the ECS Facilities Plan (DID 302/DV1).
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S-DPS-60740	The air conditioning requirements for the SPRHW CI equipment shall be in accordance with Individual Facility Requirements (DID 303/DV1) and the ECS Facilities Plan (DID 302/DV1).
S-DPS-60750	The grounding requirements for SPRHW CI equipment shall be in accordance with Individual Facility Requirements (DID 303/DV1).
S-DPS-60760	The fire alarm requirements for SPRHW CI equipment shall be in accordance with Individual Facility Requirements (DID 303/DV1).
S-DPS-60770	The acoustical requirements for SPRHW CI equipment shall be in accordance with Individual Facilities Requirements (DID 303/DV1).
S-DPS-60780	The physical interface requirements between SPRHW CI equipment and the facility shall be in accordance with "Individual Facilities Requirements (DID 303/DV1).
S-DPS-60790	The footprint size and the physical layout of SPRHW CI equipment shall be in accordance with the Individual Facilities Requirements (DID 303/DV1 and ECS Facilities Plan (DID 302/DV1).

#### **4.7.5.6 Test Requirements**

This section contains the test requirements for the Science Processing HWCI for each release and DAAC site. These requirements are related to science Processing HWCI testing of units, subsystems, I&T, end-to-end, and interface testing.

S-DPS-60910	The SPRHW CI shall support test activities throughout the development phase.
S-DPS-60920	The following testing shall be performed on the SPRHW CI: <ul style="list-style-type: none"> <li>a. Unit testing,</li> <li>b. Subsystem testing,</li> <li>c. Integration &amp; Testing,</li> <li>d. End-to- End testing.</li> </ul>
S-DPS-60930	The SPRHW CI shall provide test tools as designated in the SDPS Test Tool Matrix.
S-DPS-60940	The SPRHW CI shall be capable of simultaneously supporting the Independent Verification & Validation (IV&V) activities and the ECS development activities, both before and after flight operations begin.
S-DPS-60950	The SPRHW CI shall be capable of supporting end-to-end test and verification activities of the EOS program including during the pre-launch, spacecraft verification, and instrument verification phases.

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| S-DPS-60960 | The SPRHW CI shall support end-to-end EOS system testing and fault isolation. |
| S-DPS-60970 | The SPRHW CI shall be capable of being monitored during testing.              |

#### **4.7.5.7 Hardware Configuration Item Requirements**

This section contains the HWCI requirements for the Science Processing HWCI that are specific for each HWCI component for each release and DAAC site.

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| S-DPS-61040 | The SPRHW CI computer platform shall provide a hard media device with a capacity of TBD GB for software and system maintenance and upgrade support. |
| S-DPS-61045 | The SPRHW CI shall provide local consoles for maintenance and operation.  |

#### **4.7.5.8 Operating System, Utilities, and Tools**

This section contains the operating system, utilities, and tools requirements for the Science Processing HWCI for each release and DAAC site.

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| S-DPS-61110 | The operating system for each Unix platform in the SPRHW CI shall conform to the POSIX.2 standard.   |
| S-DPS-61120 | The SPRHW CI POSIX.2 compliant platform shall have the following utilities installed at a minimum: perl, emacs, gzip, tar, imake, prof, gprof, nm. |
| S-DPS-61130 | The SPRHW CI POSIX.2 compliant platform shall have the following POSIX.2 user Portability Utilities installed at a minimum: man, vi.               |
| S-DPS-61140 | The SPRHW CI POSIX.2 compliant platform shall have the following POSIX.2 Software Development Utilities installed at a minimum: make.              |
| S-DPS-61150 | The SPRHW CI POSIX.2 compliant platform shall have the following POSIX.2 C-Language Development Utilities installed at a minimum: lex, yacc.       |
| S-DPS-61160 | The SPRHW CI POSIX.2 compliant platform shall have the following Unix shells installed at a minimum: C shell, Bourne shell, Korn shell.            |
| S-DPS-61170 | The SPRHW CI POSIX.2 compliant platform shall have on-line documentation or printed documentation for each installed tool.                         |
| S-DPS-61171 | The SPRHW CI shall have provision for a dynamic analyzer to support the capability to check Science Software source code for memory leaks.         |

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| S-DPS-61172 | The SPRHW CI POSIX.2 compliant platform shall have installed one or more development environment supporting the following languages: <ul style="list-style-type: none"> <li>a. C,</li> <li>b. FORTRAN-77.</li> </ul>                               |
| S-DPS-61173 | Each development environment associated with the POSIX.2 compliant platform in the SPRHW CI shall have the capability to compile and link strictly conformant POSIX-compliant source code.   |
| S-DPS-61174 | Each development environment associated with the POSIX.2 compliant platform in the SPRHW CI shall have the capability to compile and link source code containing extensions specified in the Data Production S/W and SCF Standards and Guidelines. |
| S-DPS-61175 | Each development environment associated with the POSIX.2 compliant platform in the SPRHW CI shall have an interactive source level debugger for ECS supported languages.   |
| S-DPS-61177 | The SPRHW CI POSIX.2 compliant platform supporting AI&T of CERES S/W shall have installed an ADA development environment.  |

#### **4.7.6 AITHW - Algorithm Integration and Test HWCI**

The Algorithm Integration & Test HWCI (AITHW) is an HWCI contained within the Processing Subsystem, which provides hardware resources to support DAAC operations and users performing science data Algorithm Integration & Test (AI&T), system validation and integration and test. Science processors supporting AI&T are contained within the SPRHW CI. The AITHW CI will not interfere with operations in science processing and will have enough capacity to be used as a backup resource.

##### **4.7.6.1 Functional Requirements**

This section contains the functional requirements for the Algorithm Integration & Test HWCI for each release and DAAC site.

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| S-DPS-70010 | The AITHW CI shall provide hardware resources to operations staff for the monitor and control of Science Software Integration and Test (AI&T) on SPRHW CI processing resources.  |
| S-DPS-70030 | The AITHW CI shall provide hardware resources to operations staff for the monitor and control of Science Software configuration management.  |
| S-DPS-70050 | The Algorithm Integration and Test HWCI design and implementation shall have the flexibility to accommodate Algorithm Integration and Test expansion up to a factor of 3 in its capacity with no changes in its design and up to a factor of 10 without major changes to its design. |



#### 4.7.6.2 Operating System, Utilities, and Tools

This section contains the operating system, utilities, and tools requirements for the Algorithm Integration & Test HWCI for each release and DAAC site.

S-DPS-70110	The operating system for each UNIX platform in the AITHW CI shall conform to the POSIX.2 standard.
S-DPS-70120	The AITHW CI POSIX.2 compliant platform shall have the following utilities installed at a minimum: perl, emacs, gzip, tar, imake, prof, gprof, nm.
S-DPS-70130	The AITHW CI POSIX.2 compliant platform shall have the following POSIX.2 User Portability Utilities installed at a minimum: man, vi.
S-DPS-70140	The AITHW CI POSIX.2 compliant platform shall have the following POSIX.2 Software Development Utilities installed at a minimum: make.
S-DPS-70150	The AITHW CI POSIX.2 compliant platform shall have the following POSIX.2 C-Language Development Utilities installed at a minimum: lex, yacc.
S-DPS-70160	The AITHW CI POSIX.2 compliant platform shall have the following Unix shells installed at a minimum: C shell, Bourne shell, Korn shell.
S-DPS-70180	The AITHW CI shall have provision for a dynamic analyzer to support the capability to check Science Software source code for memory leaks.
S-DPS-70183	The AITHW CI POSIX.2 compliant platform shall have on-line documentation or printed documentation for each installed tool.
S-DPS-70185	The AITHW CI shall have provision for a dynamic analyzer to support the capability to check Science Software source code for memory leaks.
S-DPS-70190	The AITHW CI POSIX.2 compliant platform shall have installed one or more development environment supporting the following languages: <ul style="list-style-type: none"><li>a. C,</li><li>b. FORTRAN-77.</li></ul>
S-DPS-70220	Each development environment associated with the POSIX.2 compliant platform in the AITHW CI shall have the capability to compile and link strictly conformant POSIX-compliant source code.
S-DPS-70230	Each development environment associated with the POSIX.2 compliant platform in the AITHW CI shall have the capability to compile and link source code containing extensions specified in the Data Production S/W and SCF Standards and Guidelines.

S-DPS-70240	Each development environment associated with the POSIX.2 compliant platform in the AITHW CI shall have an interactive source level debugger for ECS supported languages.
S-DPS-70250	Each development environment associated with the POSIX.2 compliant platform in the AITHW CI shall have a screen capture utility.
S-DPS-70260	The AITHW CI shall include a set of profiling tools, with the capability to measure the average and maximum of the following: <ul style="list-style-type: none"> <li>a. CPU time,</li> <li>b. memory usage,</li> <li>c. disk space usage of a process.</li> </ul>
S-DPS-70270	The AITHW CI profiling tools shall be accessible via an API (application program interface).
S-DPS-70280	The AITHW CI profiling tools shall be accessible via a GUI (graphical user interface).

#### **4.7.7 AQAHW - Algorithm QA HWCI**

The Algorithm Quality Assurance HWCI (AQAHW) is a HWCI within the Processing Subsystem, which contains hardware resources to support DAAC operations and users performing planned routine QA of product data. This HWCI consists of QA monitors and workstations ranging from X-terminals to small user workstations to medium or large graphics workstations. The complement is site dependent and is a function of classes of production performed.

##### **4.7.7.1 Functional Requirements**

This section contains the functional requirements for the Algorithm Quality Assurance HWCI for each release and DAAC site.

S-DPS-80010	The AQAHW CI shall provide for hardware resources to support DAAC operations staff performing routine QA of Product data.
S-DPS-80011	The AQAHW CI shall provide an operational availability of 0.993, at a minimum, and an MDT of 2 hours or less.

##### **4.7.7.2 Operating System, Utilities, and Tools**

This section contains the operating system, utilities, and tools requirements for the AQAHW CI for each release and DAAC site.

S-DPS-80110	The operating system for each UNIX platform in the AQAHW CI shall conform to the POSIX.2 standard.
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- S-DPS-80120      The AQAHW CI POSIX.2 compliant platform shall have the following Utilities installed at a minimum: perl, emacs, gzip, tar, imake, prof, gprof, nm.
- S-DPS-80130      The AQAHW CI POSIX.2 compliant platform shall have the following POSIX.2 User Portability Utilities installed at a minimum: man, vi.
- S-DPS-80140      The AQAHW CI POSIX.2 compliant platform shall have the following POSIX.2 Software Development Utilities installed at a minimum: make.
- S-DPS-80150      The AQAHW CI POSIX.2 compliant platform shall have the following Unix shells installed at a minimum: C shell, Bourne shell, Korn shell.
- S-DPS-80155      The AQAHW CI POSIX.2 compliant platform shall have on-line documentation or printed documentation for each installed tool.

## Abbreviations and Acronyms

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ACMHW	Access and Control Management HWCI
ADC	affiliated data center
ADSHW	Advertising Server HWCI
ADSRV	Advertising Service CSCI
AI&T	algorithm integration and test
AITHW	Algorithm Integration and Test HWCI
AITTL	Algorithm Integration and Test CSCI
AM-1	EOS AM Project spacecraft 1, morning spacecraft series -- ASTER, CERES, MISR, MODIS and MOPITT instruments
ANSI	American National Standards Institute
API	application program (or programming) interface
APID	application's process ID
AQAHW	Algorithm QA HWCI
ASCII	American Standard Code for Information Exchange
ASTER	Advanced Spaceborne Thermal Emission and Reflection Radiometer (formerly ITIR)
AVHRR	Advanced Very High-Resolution Radiometer
BER	bit error rate
BUFR	binary universal format for representation of data
CCSDS	Consultative Committee for Space Data Systems
CD-ROM	compact disk -- read only memory
CDRL	contract data requirements list
CERES	Clouds and Earth's Radiant Energy System
CI	configuration item
COTS	commercial off-the-shelf (hardware or software)
CPU	central processing unit
CSCI	computer software configuration item
CSMS	Communications and Systems Management Segment (ECS)
DAAC	Distributed Active Archive Center
DAN	data availability notice

DAO	Data Assimilation Office
DAR	data acquisition request
DAS	data availability schedule
DDICT	Data Dictionary CSCI
DDIST	Data Distribution Services CSCI
DDSRV	Document Data Server CSCI
DESKT	Desktop CSCI
DID	data item description
DIM	distributed information manager (SDPS)
DIMGR	Distributed Information Manager CSCI
DIPHW	Distribution and Ingest Peripheral Management HWCI
DMGHW	Data Management HWCI
DPR	data processing request
DPREP	Science Data Preprocessing CSCI
DRPHW	Data Repository HWCI
ECS	EOSDIS Core System
EDC	EROS Data Center (DAAC)
EDHS	ECS Data Handling System
EDOS	EOS Data and Operations System
EOS	Earth Observing System
EOS-AM	EOS Morning Crossing (Descending) Mission -- see AM-1
EOSDIS	Earth Observing System Data and Information System
ESDIS	Earth Science Data and Information System (GSFC)
ESDT	Earth science data types
ESN	EOSDIS Science Network (ECS)
FDDI	fiber distributed data interface
FDF	flight dynamics facility
FDFEPHEM	FDF-generated definitive orbit data
FOS	Flight Operations Segment (ECS)
GB	gigabyte ( $10^9$ )
GNU	(recursive acronym: “GNU’s Not Unix”); a project supported by the Free Software Foundation dedicated to the delivery of free software

GPCP	Global Precipitation Climatology Project
GPCP	Global Precipitation Climatology Project
GPI	GOES Precipitation Index
GRIB	GRid In Binary
GSFC	Goddard Space Flight Center
GTWAY	Version 0 Interoperability Gateway CSCI
GUI	graphic user interface
GV	ground validation
HDF	hierarchical data format
HDF-EOS	an EOS proposed standard for a specialized HDF data format
HIPPI	high performance parallel interface
HMI	human machine interface
HTML	HyperText Markup Language
HTTP	Hypertext Transport Protocol
HWCI	hardware configuration item
I&T	integration and test
I/F	interface
I/O	input/output
ICD	interface control document
ICLHW	Ingest Client HWCI
ID	identification
IERS	International Earth Rotation Service
IMS	Information Management System (obsolete ECS element name)
INGST	Ingest Services CSCI
IP	international partners
IR-1	Interim Release 1
IRD	interface requirements document
ISO	International Standards Organization
IV&V	independent verification and validation
JPL	Jet Propulsion Laboratory
L0-L4	Level 0 (zero) through Level 4

LaRC	Langley Research Center (DAAC)
LIM	local information manager (SDPS)
LIMGR	Local Information Manager CSCI
LIS	Lightning Imaging Sensor
LSM	local system management (ECS)
MB	megabyte ( $10^6$ )
MDT	mean downtime
MDT	mean downtime
MFLOPS	mega (millions of) floating-point operations ( $10^6$ ) per second
MISR	Multi-Angle Imaging SpectroRadiometer
MODIS	Moderate-Resolution Imaging Spectrometer
MOPITT	Measurements of Pollution in the Troposphere
MSFC	Marshall Space Flight Center
MSS	System Management Subsystem (of CSMS)
MTBF	mean time between failure
MTPE	Mission to Planet Earth
MTTR	mean time to restore
NESDIS	National Environmental Satellite Data and Information Service
NMC	National Meteorological Center (NOAA)
NOAA	National Oceanic and Atmospheric Administration
NSIDC	National Snow and Ice Data Center (DAAC)
O/A	orbit/altitude
ODC	other data center
OSI	Open System Interconnect
PDPS	Planning & Data Production System
PDR	Preliminary Design Review
PDS	production data set
PGE	product generation executable
PGS	Product Generation System (obsolete ECS element name) (ASTER)
PLANG	Production Planning CSCI
PLNHW	Planning HWCI

POSIX	Portable Operating System Interface for Computer Environments
PR	Precipitation Radar (TRMM)
PRONG	Processing CSCI
QA	quality assurance
RMA	reliability, maintainability, availability
RTF	rich text format
SAA	satellite active archive
SAGE	Stratospheric Aerosol and Gas Experiment
SCF	Science Computing Facility
SDP	Science Data Processing
SDPF	Sensor Data Processing Facility (GSFC)
SDPS	Science Data Processing Segment (ECS)
SDPTK	SDP Toolkit CSCI
SDSRV	Science Data Server CSCI
SFDU	Standard Format Data Unit
SMC	System Management Center (ECS)
SPRHW	Science Processing HWCI
SRS	software requirements specification
SSM/I	Special Sensor for Microwave/Imaging (DMSP)
SST	sea surface temperature
STMGT	Storage Management Software CSCI
TBD	to be defined
TBD	to be determined
TMI	TRMM Microwave Image
TOMS	Total Ozone Mapping Spectrometer
TONS	TDRS On-board Navigational System
TRMM	Tropical Rainfall Measuring Mission (joint US-Japan)
TSDIS	TRMM Science Data and Information System
USNO	US Naval Observatory
UT	universal time
UTC	universal time code



V0	Version 0
VIRS	Visible Infrared Scanner (TRMM)
WAIS	Wide Area Information Server
WKBCH	Workbench CSCI
WKSHW	Working Storage HWCI
WWW	World-Wide Web

# Glossary

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Advertising Service	An ECS software component that announces the availability of data and services to ECS users.
Affiliated Data Center	A facility not funded by NASA that processes, archives, and distributes Earth science data useful for Global Change research, with which a working agreement has been negotiated by the EOS program. The agreement provides for the establishment of the degree of connectivity and interoperability between EOSDIS and the ADC needed to meet the specific data access requirements involved in a manner consistent and compatible with EOSDIS services. Such data-related services to be provided to EOSDIS by the ADC can vary considerably for each specific case.
Archive Tape Library	Archive robotics unit
Averaging	Standard data averaging involves extraction from a data granule of aggregate pixels formed by numerically averaging the N adjacent pixels in each of one or more dimensions of the granule. The number of pixels in each dimension to be averaged is characterized by the value of “N.”
Catalog Interoperability	<p>Refers to the capability of the user interface software of one data set directory or catalog to interact with the user interface at another data set directory or catalog. Three levels of Catalog Interoperability are recognized:</p> <p>Level 1 Interoperability—simple network interconnectivity among systems.</p> <p>Level 2 Interoperability—catalog systems can exchange limited search and user information.</p> <p>Level 3 Interoperability—catalog systems exchange standard search protocols. This provides “virtual” similarity between different systems.</p>
Client	A software component that sends Service Requests to ECS servers or Service Providers.
Client Session	(See Session)

Commercial Off-The-Self (COTS)	“Commercial off-the-shelf” means a product, such as an item, material, software, component, subsystem, or system, sold or traded to the general public in the course of normal business operations at prices based on established catalog or market prices (see FAR 15.804-3(c) for explanation of terms).
Correctable BER	Rate of occurrence of correctable bit errors (bit errors that are generally corrected by the corresponding hardware)
Data Center	A facility storing, maintaining, and making available data sets for expected use in ongoing and/or future activities. Data centers provide selection and replication of data and needed documentation and, often, the generation of user tailored data products.
Data Product Levels	<p>Data levels 1 through 4 as defined in the EOS Data Panel Report. Consistent with the CODMAC and ESADS definitions.</p> <p>Raw Data–Data in their original packets, as received from the spacecraft and instruments, unprocessed by EDOS.</p> <p>Level 0–Raw instrument data at original resolution, time ordered, with duplicate packets removed.</p> <p>Level 1A–Level 0 data, which may have been reformatted or transformed reversibly, located to a coordinate system, and packaged with needed ancillary and engineering data.</p> <p>Level 1B–Radiometrically corrected and calibrated data in physical units at full instrument resolution as acquired.</p> <p>Level 2–Retrieved environmental variables (e.g., ocean wave height, soil moisture, ice concentration) at the same location and similar resolution as the Level 1 source data.</p> <p>Level 3–Data or retrieved environmental variables that have been spatially and/or temporally resampled (i.e., derived from Level 1 or Level 2 data products). Such resampling may include averaging and compositing.</p> <p>Level 4–Model output and/or variables derived from lower level data which are not directly measured by the instruments. For example, new variables based upon a time series of Level 2 or Level 3 data.</p>
Data Server	A logical association of services that provide access to a collection of earth science and related data.
Directive	Flowdown of policy.

Distributed Active Archive Center	An EOSDIS facility which generates, archives, and distributes EOS Standard Products and related information for the duration of the EOS mission. An EOSDIS DAAC is managed by an institution such as a NASA field center or a university, per agreement with NASA. Each DAAC contains functional elements for processing data (the PGS), for archiving and disseminating data (the DADS), and for user services and information management (elements of the IMS).
ECS-Supported	A hardware or software component that conforms to an ESDIS approved set of standards and has been fully tested by the ECS contractor.
Event	In reference to subscriptions, the occurrence that triggers a subscription action
External Data Provider	An external data source providing data to be ingested into SDPS.
Facilities (IICF)	higher-level data sets.
Facility Instrument	An instrument defined by NASA as having broad significance to the EOS Program and provided by a designated NASA center or foreign agency.
Field-expandable	Storage hardware where the capacity or size of archival storage can be increased at the local site without removing the hardware from the local site
Institutional Facilities or Elements	Facilities established by an institution that take on some responsibility in support of EOSDIS, or elements of the EOSDIS that function as part of an institution, and represent both EOSDIS and the programs, goals and purpose of the institution.
Interdisciplinary	Project-provided facilities at interdisciplinary investigator locations
Investigator Computing	used to pursue EOS-approved investigations and produce
Investigator Working Group (IWG)	A group made up of the Principal Investigators and research
Mediation Callbacks	Mediation Callbacks are a mechanism by which the system obtains information from the user regarding directions for the execution of an active Service Request.
Off-Line	Access to information by mail, telephone, facsimile, or other non-direct interface.
On-Line	Access to information by direct interface to an information data base via electronic networking.

Operations Staff	Generic term for personnel who have the responsibility to operate, monitor, and control SDPS.
Physical Media Class	Class of physical media (e.g., 3480 tape, D3 tape, M/O disk)
Principal Investigator (PI)	An individual who is contracted to conduct a specific scientific investigation. (An Instrument PI is the person designated by the EOS Program as ultimately responsible for the delivery and performance of Standard Products derived from an EOS Instrument Investigation.)
Principal Investigator Computing Facility (PICF)	Project-provided facilities at PI locations used to develop and maintain algorithms, produce data sets, and validate data.
Principal Investigator Instrument	An instrument selected pursuant to the EOS Announcement of Opportunity and provided by a PI and his home institution.
Scheduling	automatic scheduling of a full set of events. Incremental scheduling is interactive scheduling of selected events. For example, the initial generation of a schedule might use batch scheduling, while the addition of a single event with the desire to avoid perturbing previously scheduled events might use incremental scheduling.
Science Processing Library	The Science Processing Library (SPL) is a repository of software, contributed by scientists and other users, to which ECS will provide access in order to facilitate the reuse of software throughout the community. This software is made available as it was contributed with ECS performing only a cataloging function to identify for users what is available. ECS is not responsible for the validity or maintenance of the software contained in the Science Processing Library.
Science User	A user of the SDPS from the scientist community or other user community that originates Service Requests.
Server	A software component that receives and executes Service Requests (e.g., the LIM, the DIM, the Data Server, the PLANG CI).
Service Class	A group of ECS services and their associated data.

## Session

A session is a logical context assigned to a user or a client in which a set of Service Requests are performed. Sessions associate and manage the resources and Results Sets that are allocated and generated as a result of the processing of Service Requests. A session retains information associated with the execution of Service Requests so that it is accessible to subsequent Service Requests. Service Requests may utilize resources and Results Sets allocated and produced by other Service Requests belonging to the same session. Service Requests issued in the context of one session cannot utilize the resources managed by another session. There are two kinds of sessions, client sessions and user sessions.

A client session supports interactions between a client and a server. Client sessions associate and manage the resources and Results Sets that are allocated and generated by the server.

A user session supports interactions between the user and all of ECS and allow the user to interact with ECS as a single entity. User sessions manage resources and Results Sets that are directly or indirectly controlled by the user interface client. The user interface client executes user requests by issuing concurrent Service Requests between the user interface client and one or more servers. These Service Requests are supported by one or more client sessions.

Sessions have the following states:

- a. Active—The session is established and will allow Service Requests to allocate and access session resources.
- b. Suspended—The session is established, but will not accept Service Requests. Session resources are saved but not accessible.
- c. Terminated—The processing of Service Requests in the session's context is no longer possible. Session resources have been returned to the system.

## Subsampling

Standard subsampling involves extraction of a multi-dimensional rectangular array of pixels from a single data granule, where regularly-spaced, non-consecutive pixels are extracted from each array dimension. For each dimension, the size of the pixel array is characterized by the starting pixel location, the number of pixels to extract, and the pixel-spacing between extracted pixels.

Subscription Event	An event (or set of events) identified in a subscription. The event is either future data arrival or the expiration of a timer.
Subsetting	Standard subsetting involves extraction of a multi-dimensional rectangular array of pixels from a single data granule, where consecutive pixels are extracted from each array dimension. For each dimension, the size of the pixel array is characterized by the starting pixel location and the number of pixels to extract.
Target of Opportunity (TOO)	A TOO is a science event or phenomenon that cannot be fully predicted in advance, thus requiring timely system response or high-priority processing.
Team Member Computing Facilities (TMCF)	Project-provided facilities at research instrument team member locations used to develop and test algorithms and assess data quality.
User	A user is a person that originates Service Requests to be processed by SDPS. Includes science users, and operations staff.
User Interface Client	A user interface client is a software component that interacts directly with the user and submits Service Requests to ECS servers.
User Session	(See Session)
User Pull Area	The user pull area is a network-accessible data storage mechanism that provides users the capability to retrieve data immediately, and at a time of their convenience.